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PREMIUMS

OFFERED BY THE

SOCIETY,

INSTITUTED AT LONDON,

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES, AND COMMERCE;

WITH

ORIGINAL PAPERS,

COMMUNICATED TO THE

SOCIETY.

TO THE
P U B L I C K.

ADELPHI BUILDINGS, April 10, 1783.

THE chief objects of the attention of the Society for the Encouragement of Arts, Manufactures, and Commerce, in the application of their Rewards, are Ingenuity in the several branches of the Polite and Liberal Arts, useful Discoveries and Improvements in Agriculture, Manufactures, Mechanicks, and Chemistry, or the laying open any such to the Publick; and in general, all such useful inventions, discoveries, or improvements (though not mentioned in the Book of Premiums), as may appear to have a tendency to the advantage of trade and commerce; the Society therefore, in pursuance of their plan, propose to bestow the following premiums.

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Premiums

Premiums for Planting and Husbandry.

1. ACORNS. For setting or sowing the greatest quantity of land, not less than ten acres, with acorns, between the first day of October, 1782, and the first of January, 1783; and for fencing and preserving the same effectually, in order to raise timber; the gold medal.

2. For the second greatest quantity of land, not less than five acres, set or sown with acorns, agreeably to the above conditions; the silver medal.

CERTIFICATES of the setting or sowing agreeably to the above conditions; and that there are not fewer than one thousand plants on each acre, to be produced to the Society, on or before the first Tuesday in November, 1783.

3, 4. The same premiums are extended one year farther.

CERTIFICATES to be produced on or before the first Tuesday in November, 1784.

5. RAISING

5. RAISING OAKS. To the person who shall raise the greatest number of oaks, not fewer than five thousand, either from young plants, or from acorns, in woods, parks, or forests, that have long been under timber, and effectually fence and preserve the same, in order to secure a succession of oak timber in this kingdom; the gold medal.

CERTIFICATES and accounts to be produced on or before the first Tuesday in January, 1788.

6. CHESNUTS. For setting or sowing the greatest quantity of land, not less than six acres, with Spanish Chesnuts, before the first day of May, 1783, and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

7. For the second greatest quantity, not less than four acres; the silver medal.

8. For the third greatest quantity, not less than two acres; the silver medal.

CERTIFICATES of setting or sowing agreeably to the above conditions (and that there are twelve hundred Spanish Chesnut plants at least, on each acre), must be delivered to the Society on or before the first Tuesday in November, 1783.

9, 10, 11. The like premiums will be given for setting or sowing Spanish Chesnuts before the first of May, 1784.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1784.

12. ELM. For planting the greatest number of the English Elm, not less than eight thousand, between the twenty-fourth of June, 1782, and the twenty-fourth of June, 1783, and for the effectually fencing and preserving the same, in order to raise timber; the gold medal.

13. For the second greatest number, not less than five thousand; the silver medal.

14. For

14. For the third greatest number, not less than four thousand; the silver medal.

CERTIFICATES of having planted agreeably to the above conditions, and specifying the distance of the trees, must be delivered to the Society, on or before the first Tuesday in November, 1783.

15, 16, 17. The same premiums are extended one year farther.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1784.

18. WEYMOUTH PINE. For planting out in the year 1783, at a distance not exceeding six feet, the greatest number of Weymouth Pines, not less than four thousand, to be two years old at least when planted out; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

E 3

19. For

19. For the second greatest number, not less than two thousand; the silver medal.

20. For the third greatest number, not less than one thousand; the silver medal.

CERTIFICATES of such planting must be delivered on or before the last Tuesday in January, 1784.

21. RED VIRGINIA CEDAR. For planting out, from the 24th of June, 1782, to the 24th of June, 1783, at a distance not more than four feet, the greatest number of the Red Virginia Cedar, not fewer than three thousand, the plants to be between two and four years old when planted out, and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

22. For the next greatest number, not fewer than two thousand; the silver medal.

CERTIFICATES of planting, according to the above conditions, to be produced
on

on or before the last Tuesday in November, 1783.

23, 24. The same premiums are extended one year farther.

CERTIFICATES to be delivered on or before the last Tuesday in November, 1784.

25. SPRUCE FIR. For planting out in one plantation, in the year 1783, at a distance not less than three, nor more than six feet, the greatest number of Spruce Firs, not less than ten thousand, to be two years old when planted out, and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

26. For the second greatest number, not less than six thousand; the silver medal.

27. For the third greatest number, not less than four thousand; the silver medal.

CERTIFICATES to be produced on or before the last Tuesday in January, 1784.

E 4 28. SILVER

28. SILVER FIR. For planting out, from the first of September, 1782, to the thirty-first of March, 1783, at a distance not less than three, nor more than six feet, the greatest number of Silver Firs, not fewer than four thousand, and for effectually fencing and preserving the same, in order to raise timber ; the gold medal.

29. For the second greatest number, not fewer than three thousand ; the silver medal.

30. For the third greatest number, not fewer than two thousand ; the silver medal.

CERTIFICATES to be produced on or before the last Tuesday in January, 1784.

31. LARCH. For planting out, from the twenty-fourth of June, 1782, to the twenty-fourth of June, 1783, at a distance not more than five feet, the greatest number of Larch-trees, not less than five thousand ; the plants to be between two
and

and four years old when planted out, and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

32. For the second greatest number, not less than three thousand; the silver medal.

CERTIFICATES of planting according to the above conditions, to be delivered on or before the last Tuesday in November, 1783.

33, 34. The like premiums will be given, on the same conditions, for planting out Larch-trees, between the twenty-fourth of June, 1783, and the twenty-fourth of June, 1784.

CERTIFICATES to be produced on or before the last Tuesday in November, 1784.

35. UTILITY OF LARCH. To the person who shall send in the most satisfactory account, verified by experiments,
of

of the utility of Larch Trees, for the various purposes of timber; the gold medal.

The accounts to be produced on or before the second Tuesday in December, 1783.

56. The same premium will be given in the year 1784; the accounts to be produced on or before the second Tuesday in December, 1784.

37. NORFOLK WILLOW. For the greatest number of acres, not less than six, planted in the year 1782, with Norfolk Willows; the number of cuttings to be at least one thousand on each acre, properly fenced and secured.

CERTIFICATES to be produced on or before the last Tuesday in December, 1783, of the said planting, and that the trees were then growing on the land; the gold medal.

38. OCCIDENTAL PLANE-TREES.
For the greatest quantity of land, not less
than

than two acres, planted with Occidental Plane-trees, in the year 1783, not less than five hundred on each acre, properly fenced and secured.

CERTIFICATES to be produced to the Society, on or before the last Tuesday in December, 1783, of the said planting, and that the trees were then growing on the land; the gold medal.

39. The same premium will be given for Occidental Plane-trees, planted in the year 1784.

CERTIFICATES to be produced on or before the last Tuesday in December, 1784.

40. ALDER. For the greatest number of acres, not less than six, planted in the year 1782, with Alders, to be at least one thousand on each acre, properly fenced and secured.

CERTIFICATES to be produced to the Society, on or before the last Tuesday in December,

December, 1783, of the said planting, and that the trees were then growing on the land ; the gold medal.

41. The same premium is extended one year farther.

CERTIFICATES to be produced on or before the last Tuesday in December, 1784.

42. UPLAND OR RED WILLOW.

For the greatest number of acres, not less than three, planted before the end of April, 1783, with Upland or Red Willow, properly fenced and secured, the number of plants on each acre to be at least twelve hundred ; the gold medal.

CERTIFICATES to be produced on or before the last Tuesday in April, 1784.

It is well known that this species of Willow thrives well on dry sandy land.

43. The same premium is extended one year farther.

CERTI-

CERTIFICATES to be produced on or before the last Tuesday in April, 1785.

44. ASH. For planting the greatest number of acres, not less than six, in the year 1783, with Ash for timber ; the plants to be at least two years old, properly secured and fenced ; the number of plants on each acre to be at least twelve hundred ; the gold medal.

45. For the next greatest number of acres, not less than four ; the silver medal.

CERTIFICATES to be delivered on or before the second Tuesday in March, 1784.

46, 47. The same premiums are extended one year farther.

CERTIFICATES to be delivered on or before the second Tuesday in December, 1785.

48, 49. The same premiums are extended one year farther.

CERTI-

CERTIFICATES to be delivered on or before the second Tuesday in December, 1786.

50. LOMBARDY or PO POPLAR. For planting, in the year 1782, the greatest number of the Lombardy Poplar, or Po Poplar, properly fenced and secured, for raising timber; the gold medal.

CERTIFICATES to be produced on or before the second Tuesday in November, 1783.

The quantity of land to be not less than six acres, and not fewer than twelve hundred plants on each acre.

N.B. This tree is called by some the Pine Poplar.

** * * The Candidates for planting all kinds of Trees, are to certify, that the respective plantations are properly fenced and secured, and particularly to state the condition the plants were in at the time of signing such Certificates.*

Any

Any information which the Candidates for the foregoing premiums may choose to communicate, relative to the methods made use of in forming the plantations, or promoting the growth of the several trees, or any other observations that may have occurred on the subject, will be thankfully received.

51. TREES FOR USE WHEN EXPOSED TO THE WEATHER. To the person who shall send the most satisfactory account, verified by experiments, to determine which of the following trees is of the greatest utility for timber, or poles, for use when exposed to the weather, viz.

Larch,	Black Poplar,
Ash,	Spanish Chesnut,
Willow,	Alder.
Lombardy Poplar,	
The gold medal.	

The accounts to be produced on or before the second Tuesday in December, 1783.

52. The

52. The same premium is extended one year farther.

The accounts to be produced on or before the second Tuesday in December, 1784.

53. PRESERVING ACORNS. To the person who shall produce to the Society the most effectual method of preventing Acorns, when sown or planted for timber, being injured by Mice; the gold medal.

The accounts, verified by actual experiments, with proper certificates that the methods made use of have been fully sufficient for the purpose, to be produced on or before the last Tuesday in November, 1784.

54. PRESERVING CHESNUTS, and SEEDS of other FOREST TREES. To the person who shall produce to the Society, the most effectual method of preventing Chesnuts, and the Seeds of other Forest Trees, when sown or planted for timber,

Timber, being destroyed by Mice ; the silver medal.

55. PRESERVING GARDEN SEEDS. For the most effectual method of preventing Garden Seeds being destroyed by birds or vermin, after they are sown ; the silver medal.

The accounts verified by actual experiments, with proper certificates that the methods made use of have been fully sufficient for the purpose ; to be produced on or before the last Tuesday in November, 1784.

56, 57, 58. The premiums for preserving Acorns, Chesnuts, and Garden Seeds, are extended one year further ; the accounts to be produced on or before the last Tuesday in November, 1785.

59. PLANTING BOGGY OR MORASSY SOILS. For an account of the best set of experiments sent by the planter, or his representative, to ascertain the comparative advantages of planting boggy or morassy soils, with White Poplar, Black Poplar,
F Lombardy

Lombardy Poplar, and Willow; the gold medal.

It is required that not less than half an acre be planted with each, and the plants to be not more than four feet asunder.

It is also required that the plantation stand fourteen years, at the end of which to be all cut down and measured, or accurately measured standing; the certificates of the measure and value, and that the whole is properly fenced and secured, to be produced on or before the first Tuesday in January, 1792.

N. B. Any information relative to the state of the plantation, if sent to the Society, between the times of planting and claiming the premium, will be thankfully received.

60. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1793.

61. The same premium is extended one year further.

CERTIFI-

CERTIFICATES to be produced on or before the first Tuesday in January, 1794.

62.- ROOTS OF CORN. To the person who shall ascertain from observation, and by experiment, the succession of the different Roots of Corn (distinguishing the times when such succession of roots takes place) particularly those which shoot out at or near the time the plants go into ear; shewing also from facts, the injury arising from the failure of those particular roots, and the most effectual means of preventing such misfortune; the gold medal.

To be produced on or before the first Tuesday in January, 1784.

63. The same premium is extended one year further. Accounts to be delivered on or before the first Tuesday in January, 1785.

N. B. These premiums are extended to Scotland and Ireland.

64. CULTURE OF WHEAT. For the best set of experiments to ascertain whether it is most advantageous to cultivate Wheat, by sowing it in the common broadcast way, or by drilling it in equi-distant rows, hoeing the intervals; the gold medal.

It is desired that the distance between the rows may not exceed eleven inches, and that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the corn, be produced to the Society, on or before the first Tuesday in February, 1784.

65. The same premium is extended one year further. The accounts to be produced to the Society, on or before the first Tuesday in February, 1785.

66. BEANS AND WHEAT. To the person who shall plant or drill, in the year 1783, the greatest quantity of land, not less than thirty acres, with beans, and shall sow the same land with Wheat in the same year; the gold medal.

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It is required that an account of the sort and quantity of Beans, the time of planting or drilling, and of reaping or mowing them, the produce per acre threshed, the application of the straw; the expense of planting or drilling, hand or horse-hoing, the distance of rows and the quality of the soil, together with certificates of the number of acres, and that the land was actually sown with wheat in the year 1782, be produced on or before the first Tuesday in November, 1783.

N.B. The Society have been informed that beans may be drilled or planted so early as the month of December, from whence may be derived the advantage of an early harvest, in which case the straw will be far more valuable than that from a later planting or drilling.

67. The same premium is extended one year farther, the accounts to be delivered on or before the first Tuesday in November, 1784.

68. POTATOES. To the person who shall cultivate the greatest quantity of land with Potatoes for the table, not less than fifty acres; the gold medal.

CERTIFICATES of the planting, with accounts of the produce of at least one acre, taken at a medium of the plantation, to be delivered to the Society on or before the last Tuesday in January, 1784.

N.B. If there are several candidates for this premium, a gold medal will be given to each of them, not exceeding five in number, who shall severally have planted the greatest quantities, not less than fifty acres.

69. TURNEPS. For the best account of experiments made on at least six acres of land, to determine the comparative advantages of the drill or broad-cast method in the cultivation of Turneps; the gold medal.

The accounts to be delivered in, on or before the third Tuesday in April, 1784.

70. The

70. The same premium is extended one year further ; the accounts to be delivered on or before the third Tuesday in April, 1785.

71. GREEN VEGETABLE FOOD.
For the best account, confirmed by experiments, of the vegetable food, (cabbages and turneps excepted) growing in the months of March and April, that will most encrease the milk in mares, cows, and ewes, at that season ; provided such food can be cultivated at an expense that will admit of its being applied to the above purposes ; the gold medal.

CERTIFICATES to be produced on or before the second Tuesday in November, 1785.

72. The same premium is extended one year farther.

CERTIFICATES to be produced on or before the second Tuesday in November, 1784.

73. MIXTURE OF GRASS SEEDS.

For the best set of experiments to ascertain the most advantageous mixture of different seeds for laying down arable land to grass, on wet or strong soils; the gold medal.

It is required that the experiments be comparative, and continued three years; that not less than three different mixtures be tried, nor less than one acre be applied to each; and that the seeds used be separate, not the produce of common meadows.

An account of the soil, preparation, crops of corn (if any), seeds used, and the produce of the new grass, whether fed or mown, to be delivered on or before the first Tuesday in January, 1784.

74. The same premium will be given on the like conditions for ascertaining the most advantageous mixture of different seeds for laying down arable land to grass, on dry or light soils.

75. TURNEP-

75. TURNEP-ROOTED CABBAGE.

For raising, and having duly cultivated Turnep-rooted Cabbage, in the year 1782, for the feeding cattle or sheep, on the greatest number of acres, not less than ten, and giving an account of the soil, culture, time, and manner of feeding off, produce, and the effects on cattle or sheep fed with it; the gold medal.

76. For the next greatest number of acres, not less than five; the silver medal.

CERTIFICATES of the quantity of land, with the accounts, to be produced on or before the last Tuesday in October, 1783.

77. CULTIVATING ROOTS AND HERBAGE FOR FEEDING SHEEP AND BLACK CATTLE.

For the most satisfactory experiments made in the year 1781, in order to ascertain which of the following plants can be cultivated and housed, or otherwise secured for winter fodder, to the greatest advantage, viz.

Turnep-

Turnep-rooted Cabbage,	Carrots,
Turnep Cabbage,	Parsneps,
Turneps,	Potatoes.

The accounts to be produced on or before the first of November, 1783; the gold medal.

It is required that the above roots be taken off the land by the last day of October, 1781; that a crop of wheat may be sown in the same ground, and the particulars of the sowing and planting, taking up, produce, preservation, and application to the feeding Sheep and Black-Cattle, be specified. The comparative experiment must be made between two or more of any of the above-mentioned plants, and not less than two acres be cultivated with each particular kind of plant.

N.B. Great advantage will arise to the farmer occupying land, in the neighbourhood of extensive commons, from the convenience of keeping large flocks of sheep, and herds of cattle, if the difficulty of supporting

porting them through the winter was obviated by a due knowledge of this practice.

78. TURNIP-ROOTED CABBAGE. To the person who shall raise, in the year 1782, the greatest quantity, per acre, of Turnip-rooted Cabbage, on not less than one acre; the gold medal.

CERTIFICATES of the number of acres, and produce by weight, free from leaves and dirt, and before housing, with an account of the soil, preparation, and culture, to be produced on or before the first Tuesday in November, 1783.

79. The same premium is extended one year further; the quantity of land to be at least four acres.

CERTIFICATES to be produced on or before the first Tuesday in November, 1784.

80. REARING AND FATTENING HOGS. For the best account of the most profitable

profitable method of rearing and fattening hogs, verified by experiments, including an account of the weight, and kind of food used, and of the weight of the hogs, both before and after fattening; to be delivered to the Society on or before the first Tuesday in March, 1784; the gold medal.

N.B. Should any person have already made observations relative either to the manner of rearing or fattening hogs, yet should not be able to comply with the terms specified in the above premium, the Society will be happy to receive from him any information which his experience may have furnished him with on the subject.

'81. MANAGING BEES. To the person who shall produce to the Society the most satisfactory account, verified by experiments, of managing Bees to the greatest advantage in this climate; the gold medal.

To be produced on or before the second Tuesday in January, 1784.

82. CULTI-

82. CULTIVATING THE TRUE RHUBARB. For raising, before the end of the year 1783, the greatest number of plants, not less than three hundred, of *Rheum Palmatum*, or true Rhubarb; the gold medal.

83. For the next greatest quantity, not less than two hundred plants; the silver medal.

CERTIFICATES of the number of plants, that they stand at least six feet asunder, that they have been in a thriving state during the preceding summer, with an account of the soil, culture, and aspect, to be produced on or before the second Tuesday in February, 1784.

84, 85. The same premiums are extended one year farther.

CERTIFICATES to be produced on or before the second Tuesday in February, 1785.

86. RHUBARB.

86. RHUBARB. For the greatest quantity of Rhubarb of British growth, not less than twenty pounds weight, equal to such as is commonly sold in the shops, under the name of Turkey or Russia Rhubarb ; five pounds of which to be produced as a sample, with certificates that the remainder is of equal goodness ; and a particular account of the manner of culture, and cure, on or before the first Tuesday in November, 1783 ; the gold medal.

87. For the next greatest quantity, not less than ten pounds weight, the silver medal.

88, 89. The same premiums are extended one year further. The samples and certificates to be produced on or before the first Tuesday in November, 1784.

90. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the person who shall produce to the Society the most satisfactory set of experiments, to ascertain the due proportion

proportion of the several component parts of Arable Land, in one or more counties in Great-Britain, by an accurate analysis of it, and who having made a like analysis of some poor land, shall, by comparing the component parts of each, and thereby ascertaining the deficiencies in the poor soil, improve a quantity of it, not less than two acres, by the addition of such parts as the former experiments shall have discovered to be wanting therein, and therefore probably the cause of its sterility; the gold medal.

It is required that the manurings, plowings, and crops of the improved land, be the same after the improvement as before, and that a minute account of the produce in each state, of the weather, and of the various influencing circumstances, together with the method made use of in analysing the soils, be produced, with proper certificates, and the chemical results of the analysis, which are to remain
the

the property of the Society, on or before the last Tuesday in November, 1788.

It is expected, that a quantity, not less than six pounds, of the rich, of the poor, and of the improved soils, be produced with the certificates.

N. B. Among the methods or processes made use of by Chemists, and called *dry*, or *moist*, the latter only appears adapted to the ascertaining the respective proportions of the component parts of arable earth.—Dr. Shaw, in his Chemical Lectures—Dr. Home, in his Principles of Agriculture—Dr. George Fordyce, in his Elements of Agriculture, and Sir Torbern Bergman, in his *Dissertation sur les Terres géoponiques*, have treated of these subjects.

91. The same premium is extended one year further; the accounts to be produced on or before the last Tuesday in November, 1789.

92. The

92. The same premium is extended one year further; the accounts to be produced on or before the last Tuesday in November, 1790.

93. IMPROVING LAND LYING WASTE. For the best account of a method for improving any of the following soils, being land lying waste or uncultivated, viz. Clay, Gravel, Sand, Chalk, Moor, or Peat-earth, and Bog; verified by experiments on not less than ten acres of land, to be produced on or before the second Tuesday in December, 1783; the gold medal for each.

94. For the next in merit, the silver medal.

The soil, manner of improvement, expense, and product, are required to be fully explained.

95, 96. The same premiums are extended one year further.

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The accounts to be produced on or before the second Tuesday in December, 1784.

97. MANURES. To the person who shall give the most satisfactory account, verified by accurate experiments, on what soil the application of Marle, Chalk, Lime, or Clay, severally, as manures, be most beneficial; the gold medal.

It is required that each experiment be made on one acre, and that they be continued four years, the same crop being sown the same year on the several spots.

It is also required, that if different manures are compared, the experiments be made on similar soils, lying near each other.

An account of the nature of the soil, manure, and the quantity laid on, with all expenses and crops, to be delivered, with specimens of the soil and manure, on
or

or before the first Tuesday in January, 1784.

98. The same premium is extended one year further.

The accounts and specimens to be produced on or before the first Tuesday in January, 1785.

99. The same premium is extended one year further.

The accounts and specimens to be produced on or before the first Tuesday in January, 1786.

100. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantage of the following manures, used as Top-Dressings, viz. Soot, Coal-Ashes, Wood-Ashes, Lime, Night-Soil; the gold medal.

It is required that not less than half an acre of land be appropriated to each manure, the soils similar, and lying near each

other, and that the same crops be sown in the same year on each spot; the experiments to be continued not less than two years.

An account of the nature of the soil, quantity, and expense of the manure and crops, with certificates, to be produced on or before the first Tuesday in December, 1784.

101. ROLLING or SCARIFYING GRASS LAND. To the person who shall, by experiment, determine whether it is most beneficial to Grass Land, to roll it with a heavy roller, or to cut the surface two or more inches deep at small intervals, with an instrument commonly called a Scarificator (which is similar to a harrow composed of coulter instead of tines); a bush harrow and light roller being afterwards drawn over the part of the field thus scarified; the gold medal.

It is required that the above experiment be made on natural grass, whether old or
new,

new, meadow or upland, provided the same has been laid down at least three years, and that the experiment be continued for four years at least. An account of the nature of the soil, weight of the roller, description of the scarificator, depth to which it cuts, and the comparative success of each method, to be delivered on or before the first Tuesday in November, 1783.

102. TO ASCERTAIN THE PROPER DEPTH OF PLOUGHING. To the person who shall give the most satisfactory account, verified by accurate experiments, in order to determine the most proper depth of Ploughing, on clay or strong land; the gold medal or fifty guineas.

It is required that all experiments be made on similar soils lying near each other, that each experiment shall consist of two acres at least, that the deepest ploughing be at least four inches deeper than the re-

puted staple of the land, or usual depth of ploughing, and that these experiments be continued during a course of six years, the same crops being sown the same year on the several spots. An account of the nature of the soil, different depths of ploughing, quantity of manure (if any) laid on each spot, all expenses and crops ; to be delivered on or before the first Tuesday in January, 1784.

N.B. If the above experiments are made on land which has little or no fall, it is then required that the land be hollow-drained, at least twelve inches deeper than the deepest ploughing.

103. ASCERTAINING THE BEST COURSE OF CROPS ON CLAY SOIL.

To the person who shall give the 'most satisfactory account, verified by comparative experiments, in order to ascertain the course of Crops, which with or without a fallow shall, during the space of eight years, prove most profitable, and shall

shall leave the land in the best state, on a Clay Soil; the gold medal, or fifty pounds.

It is required that such comparative experiments be made on three acres at least in each mode; the soil to be as contiguous and similar as possible. An account of the soil, management, and crops, to be delivered on or before the first Tuesday in January, 1786.

104. COURSE OF CROPS ON STRONG LAND. For the most satisfactory account, verified by experiments, made on not less than five acres of Clay, or wet Loam, to ascertain the advantages of the following course of crops, viz, First, Beans drilled, or planted and hoed; Secondly, Wheat; the gold medal.

These experiments to be continued two courses, or four years.

CERTIFICATES, with an account of the soil, culture, and quantity of manure

(if any) laid on, to be produced on or before the last Tuesday in March, 1784.

N.B. The success of this course of crops much depending on the land being kept entirely clean, it is expected that each crop of the Beans be horse-hoed or hand-hoed, at least three times.

105. The gold medal or twenty pounds will be given on the same conditions in the year 1788.

CERTIFICATES to be produced on or before the last Tuesday in March, 1788.

106. IMPROVING WASTE MOORS. For the improvement of the greatest number of acres of Waste Moor Land, not less than one hundred; the gold medal.

It is required, that the land before improvement be absolutely uncultivated, in a great measure useless, not let to any tenant, and without any building upon it, except cottages or huts. That in its improved state it shall be enclosed, cultivated,
and

and divided into fields with buildings erected thereon sufficient for the use and residence of a tenant.

CERTIFICATES of the number of acres, of the quality of the Moor so improved; of the mode and expense of the improvement; the state it is in as to the proportion of grass to arable; the rent at which it is let; to be produced on or before the first Tuesday in February, 1784.

The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1785.

107. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1786.

108. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account of the best method,

thod, verified by actual experiment, of Land, gained from the Sea, not less than twenty acres, on the coast of England or Wales ; the gold medal.

CERTIFICATES of the quantity of Land, and that the experiments were begun after the first of January, 1780, to be produced to the Society on or before the first Tuesday in October, 1785.

N.B. The Society have been credibly informed, that Land has been gained on the coast of Holland, by fixing rows of whisps of straw upright in the sand, at about a foot distant from each other.

109. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1786.

110. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1787.

111. DRILL

111. DRILL PLOUGH FOR HORSE BEANS. For the best Drill Plough for Horse Beans only ; being an improvement on those already in the possession of the Society, or generally known ; to be produced to the Society, on or before the first Tuesday in January, 1784 ; the silver medal, or ten guineas.

It is expected the plough be strong and cheap, no variation of depth or distance being required.

The plough to which the premium is adjudged, is to become the property of the Society.

112. MACHINE TO ANSWER THE PURPOSE OF REAPING OR MOWING CORN. For inventing a machine, to answer the purpose of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiously, and cheaper, than by any method now practised, provided it does not shed the Corn or Pulse, more than the methods

thods in common practice, and that it lays the straw in such a manner as may be easily gathered up for binding; the gold medal.

The Machine, with Certificates that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1783.

Simplicity and cheapness in the construction will be considered as principal parts of its merit.

113. SCAB IN SHEEP. To the person who shall discover to the Society the most efficacious method of curing the disorder called the *Scab in Sheep*, verified by repeated trials; the silver medal, or ten guineas.

CERTIFICATES of the cure, with an account and description of the disease, to be delivered to the Society on or before the second Tuesday in January, 1784.

The

The following is an account, containing the method made use of in, and the success attending Mr. David Day's Plantation of Ash, for which he received a premium of twenty pounds, in the year 1779.

It may be proper to note, that although this candidate chose to accept the pecuniary premium of twenty pounds (in lieu of the silver medal to which he was entitled) yet with so much disinterestedness did he act, that he added a considerable sum of money to it, and purchased a large silver cup, on which was engraven an inscription, declaring the generosity of the Society, and the occasion of his becoming possessed of the piece of plate.

To the Members of the Society, for the
Encouragement of Arts, Manufactures,
and Commerce.

Gentlemen,

IN the year 1763, I planted two acres
of Ash for a Wood, the plants six feet
from

from each other, which took up 2400 plants; I dug holes, 15 inches deep, to plant them in; I neglected them, and they got the better of me so much that I did not till them. I still thought planting was worth notice; in 1769, I planted 1 acre, 3-qrs. 8 rods, 4 feet distant from each other, which took 4845 plants; I was careful in tilling them, from which I found great advantage, as they were likely to produce three times the money the above two acres would; I still thought there was a better method. In 1771, I bedded 14 bushels of keys; in 1772, I put them in a nursery, something more than 3-qrs. of an acre. In 1773, I was determined to go on in a capital manner; I bedded 50 bushel of Ash Keys; in 1774, I planted 5 acres, 21 rod, four feet one way, and two feet the other, which required 27,914 plants. I took care to keep them very clean; small holes were dug for the plants, which I found did as well as large ones. The plants being very luxuriant and tall,
and

and planted by the hundred, at six-pence per hundred, were badly put in, and the wind had great power over them. I was obliged to head them the first year, which is generally done the second year; they now stand very clean, and are allowed by those who have seen them, to be as good as can be, and I flatter myself they will, when felled, produce the most hop-poles, for the first fall, of any plantation in England. These are likely to pay much better than the 1 acre, 3-qr. 8 rod. Finding them likely to turn out so well, I was encouraged to persevere. In 1775, I set the produce of the aforesaid 50 bushels of Ash Keys, in rows, two feet apart; in 1776, I took up half, as near as I could judge, and put them in a nursery, two feet apart one way, and four inches in one row, and eight inches in the other. My reason for planting one row as thick again as the other, was, the thick row all comes up, but in the thin row only two out of three; I could not have taken them up,
if

if they had been thicker, without injuring the standing plants. This was sufficient for 5 acres, 33 rod; they were put in with small hand-dibbers, by the thousand, at only one shilling per thousand; the men earned two shillings and six-pence per day, and the women one shilling and six-pence per day, by planting them; the 5 acres, 3-qrs. 33 roods, took up 249,900 plants. In 1778 I took the other half, which were two years old, (the youngest I have planted to stand for a wood) and planted 16 acres, 3-qrs. 27 rod, for timber and underwood. I thought the distance for planting could not be altered for the better, but the expense of putting the plants in the ground might be lessened: instead therefore of digging holes, I put six horses in a plough, and ploughed the land very deep, dressed the ground down, and planted with hand-dibbers. Where the plants were too large, as many were six feet long, I took a hop-pitcher, and made holes with it, by this method
I can

I can plant one thousand plants for two shillings; whereas my first planting cost me thirty shillings per thousand for labour only: 14 acres, 3-qrs. 13 rod, out of 16 acres, 3-qrs. 27 rod, are planted at the distance of four feet by two feet; this took up 80,682 plants; 2 acres 14 rod are planted two feet by eight inches, which took up 66,400 plants. The reason of my planting as thick again one way as the other, is, that in this manner they are so much easier to till. I have had what we call a brake and a nidget, made to draw with a horse or two, to move the earth in the alleys, and hand-hoe in the rows, which I find shortens the expense greatly, and keeps the surface of the earth cleaner than digging, though I dig in the winter, where it is necessary.

The foregoing account is as near the number of plants as can possibly be ascertained, and is certainly rather under than over the quantity.

H

The

The land has been measured, and amounts to 31 acres, 3-qrs. 26 rods, in the parishes of Chalk, Higham, Frindsbury, and Shorn; and the number of plants 442,484; all which were planted between the years 1763 and 1778.

The planting of Ash I have paid great attention to, and am certain, from my method, it will pay me well for my trouble; known facts are the best proofs, and if any gentleman has a desire to see them, I shall be happy to show my plantations, which I think will do me credit, and doubt not of their giving satisfaction. By experience I find there is an essential difference between Wild Ash and those that are trained; let all the crooked ones be rejected, and in particular be careful in getting the Ash-keys, which few people attend to.

The foregoing account is as correct as I can possibly give; if any further information is wanted, I will wait on the Society with

with my book of expense, and beg leave
to subscribe myself,

The Society's most obedient,

Little Hermitage,
Frindsbury, near
Rochester, Kent,
November 14th, 1778.

humble Servant,

DAVID DAY.

N.B. There is another advantage in
planting thicker one way than the other:
if you take care to plant your rows pro-
perly, to let the sun in as much as you can,
you may crop the alleys; which I did in
four acres, with potatoes, and had sixty
sacks, which sold for £13. 10s. The year
following I had eighteen sacks, worth £5.
which were kept for my own use.

Some of the Ash plants shot six feet the
first year after stubbing, the third years
shoot from eight to sixteen feet.

OBSERVATIONS from EXPERIENCE.

In woods that are planted thin, or in
wild woods, I have observed in very large

stubs, that there have been a great many shoots for two or three years, then many of the shoots have died away, and when they have been fit for cutting, there have been very few more hop-poles than in a middling-sized stub; if planted thick your stubs will not be so large, your shoots will be more even, and not die away so much, and you will have a great many more poles, particularly of the best poles. When I have talked to old planters (who are bigotted to their own way) they have told me I plant too thick, their reason is (though in my opinion a very absurd one) that in thirty or forty years, my wood will be too thick; supposing that to be the case (though I do not believe it) my answer is, Would you lose a crop for thirty or forty years, when you may have as good a one the first fall as you will get at the forty years end? and then if they are too thick, a man with a mattock, for ten or twenty shillings per acre,

acre, will make your wood as thin as you like.

I have observed many stubs forked and crooked, like a bottle-screw, which I believe is owing, in a great measure, to not casting the crooked plants, and omitting to make choice of straight well-limbed trees, from which to get the keys.

I have planted a few wild ash ; and have bought some nursery plants ; those I have raised are much better than either. It would pay me to take up the wild ones, and re-plant with those of my own training.

The Gold medal, being the premium offered for planting Ash, was adjudged to Mr. David Day, of Frindsbury, near Rochester, in Kent, in the year 1780, from whom the following Letters were received.

To the Society for Encouragement of Arts, Manufactures, and Commerce.

Little Hermitage, near Rochester.

Gentlemen,

I ONCE more take the liberty of laying before you an account of my planting Ash, for timber and underwood, in the year 1780, with my method of planting, which I find, by twenty years experience, much the cheapest and easiest way I have yet pursued.

Jan. 11, 1780. To plough- £. s. d,
ing four acres, Barley Gratten,
in Stone Field (very deep) in
the parish of Frindsbury - 2 0 0

To taking up and planting
10,800 Ash Plants, in ditto, at
9d. per hundred - 4 1 0
Dug

Dug the holes a spade deep, £. s. d.
 planted four feet square; the
 land being poor, thought it was
 as many plants as the ground
 would bear; I have sown the
 same land with weld, which pro-
 mises fair to answer very well,
 and will make me pay great at-
 tention to keeping the land clean.

To ploughing three acres in
 hay lands in the parish of
 Shorn, at 10s. per acre. - 1 10 0

To taking up and planting
 8100 plants in ditto, at 1s. per
 hundred - - - - 4 1 0

Dug the holes a spade deep;
 the land working worse than
 the four acres, stone field, obli-
 ged me to give 5d. per hundred
 more, planted four feet square.

To twice ploughing one acre
 in Long Field, in the parish of
 Higham - - - - 0 18 0

H 4

To

To taking up and planting
5400 plants in ditto, at 1s. per
hundred - - - - 2 14 0

Planted only four feet by two
feet, a spade deep

To planting half an acre, in
Great Field, in the parish of
Frindsbury, a hedge-row, 1500
plants, at 1s. per hundred - 0 15 0

To planting hedge-row, half
an acre, in large Hop-ground, in
the parish of Frindsbury, 1500
plants, at 1s. per hundred - 0 15 0

Grubbed and carried the mould
away, which paid more than
the expense of grubbing, &c,

To 2000 plants in Chalk
Hole, about one acre, at 1s. per
hundred - - - - 1 0 0

To carriage of 29,300 plants
to said fields - - - - 1 0 0

The

The said pieces of land were £. s. d.
all planted between the 11th of
January and 25th of March,
1780.

Oct. 20, 1780. To plough-
ing a field called Piper's Acre,
eleven acres cloverlay, in the
parish of Higham, very deep,
with six horses, it ploughed very
well, and four acres in the parish
of Shorn, very deep, at 8s. per
acre " " " " 6 0 0

To ploughing two acres
Wheat Gratten, in the parish
of Higham, at 8s. per acre. - 0 16 0

To taking up 120,000 plants,
at 1½d. per hundred - " 7 10 0

To trimming ditto, at 1½d. per
hundred. " " " " 7 10 0

N.B. The reason of my hav-
ing the plants taken up so
cheap, is my method of plant-
ing;

ing; they standing only four *£. s. d.*
 inches apart in the rows, and
 two feet between; I take up
 every other row, and thin the
 standing row two feet distance,
 which wants nothing more than
 raising up with a mattock. The
 plants are all four years old, and
 run from five to twelve feet
 long, and are allowed by judges
 to be the best nursery in this
 country; I believe I may say
 in England.

To five days work with my
 team, carrying the plants to
 the said field, at 10s. per day 2 10 0

Having so large a quantity to
 put in, necessity obliged me to
 contrive a more speedy and
 cheaper method than digging
 the holes, which I think answers
 the purpose full as well, if not
 better.

I took

I took a common strike £. s. d.
 plough, added mould boards to it
 a little wider than common, put
 in four horses double, and struck
 the said fields in rows, very
 deep, two feet apart, planted
 every other row two feet apart
 in the row, which took up
 5500 plants on every acre; I
 find by experience this is not
 too thick on good land; the
 land is kept clean much cheaper,
 and turns sooner to profit.

To striking said fields, seven-
 teen acres, at 3s. per acre - 2 11 0

To planting 94,000 plants,
 at 1½ per hundred - - 5 17 6

The land being so well pre-
 pared to receive the plants, the
 men had little more to do than
 to draw the earth to the plants
 with their feet, and tread them
 up; each man would put in

1100 or

1100 or 1200 a day, though in the shortest days of the year.

I had what I call hand packers, which each man carried in his hand, with which, when he came to a larger rooted plant than common, he made the drill something deeper.

One acre of nursery, in the parish of Higham, thinned and replanted at a proper distance for a wood, two feet by four feet.

Four acres of nursery, in the parish of Shorn, thinned and replanted at a proper distance for a wood, two feet by four feet; I mention replanting, though I do not believe I planted fifty plants in the above five acres, the nurseries having taken so well that there were no gaps in them,

Note.

Note. The ground being £. s. d.
ready, and the plants on the
spot, it required only two days
work for ten hands to complete
the said plantations.

What the frost prevented our
finishing in December, has since
been completed; but it being
mostly head lands, it was neces-
sary to dig holes to plant most of
them, for which I gave the men - 0 10 6

£51 19 0

Out of the above £51. 19s.
there was expended for plough-
ing, striking, and carriage of
plants - - - - 17 5 0

For hand labour only - 34 14 0

£51 19 0

The

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The Number of Acres planted in the
Parishes of Frindsbury, Shorn, and
Higham, in 1780.

		Acres	Roods
In Frindsbury,	Stone Field -	4	0
Ditto	Waste Land in Great Field - -	0	2
Ditto	Large Hop Ground	0	2
In Shorn	Part of sixteen acres	3	1
Ditto	Chalk Hole Piece -	1	0
Ditto	A four acre field -	4	0
In Higham	Longfield -	1	0
Ditto	Piper's Acre -	11	0
Ditto	A two-acre piece -	2	0
Ditto	Part of Longfield was a nursery -	1	0
In Shorn	A nursery -	4	0
		32	1

The

AGRICULTURE.

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The number of plants taken up in
whole • - - - - 149,300

The number of plants in nursery,
which are left to set out for
woods - - - - - 27,500

176,800

Out of which number I planted
in hedge-rows, and mended my
old plantation with - 18,700

Sold - - - - - 7,300

26,000

Deduct 26,000

Total of what was planted in the
above 32 acres and 1 rood 150,800

The plants cost me nothing, as I have
sold more than pays the expense of raising
them; I sold them from 5s. to 10s. per
100, but very few at 10s. yet if valued,
they would amount as follows.

150,800 plants at 5s. per 100 £377 0 0

The

The above plantations are all properly fenced and secured, the land my own, and the account of expenses, &c. is as just and correct as possible.

I have been told by persons who are judges, that my method of planting, as well as the plantations, are worthy notice. If any Gentlemen will do me the honour to view them, I shall be happy to give them every information in my power, which I think my duty, for the honours conferred on,

Gentlemen,

Your much obliged,

and obedient humble servant,

DAVID DAY.

The

The following is an Account of the Plantation of Scotch Firs, for which the Gold Medal was adjudged to Francis Moore, of Aspley Guise, Esq. in the Year 1779.

To the Society for the Encouragement of
Arts, Manufactures, and Commerce,

Gentlemen,

THE perusal of your annual book, wherein you offer premiums, induced me to become a candidate for your favour, and humbly to submit the following account of Plantations of Scotch Firs, and the consequent improvement of barren (and otherwise useless) land, to your attention.

I live in a part of England, about forty miles distant from London, where some of the land is exceedingly sandy, poor, and mountainous, and totally unfit for cultivation, at least the expence of cultivating

I

it

it would cost infinitely more than the value of the land when cultivated, so that many hundred acres now lie barren, and apparently of no kind of use or benefit whatever; such was the state of the land marked AC and D in the plans.* Timber and fuel of all kinds being very dear;† and observing several small plantations of Scotch Firs to prosper very well upon this soil, I was induced to make various plantations at different times and seasons, for several years past, and it is with the utmost pleasure I can assure you it has been attended with great success. The plants are in a very flourishing condition, many of which have made shoots of three feet, and upwards, within the year.

I am convinced, by various instances, and frequent observations in the neighbourhood, of several small plantations of Scotch Firs, of the respective growth of

* The original plans referred to are preserved in the Society's Collection.

† Coals 17d. and 1s. 6d per bushel. Faggots £1. 1s. per hundred.

twelve,

twelve, sixteen, twenty, and twenty-six years, that being thinned at twelve, sixteen, and twenty years growth, reducing the number of trees to one fourth, or 676 trees, there will remain a profit from the sale of the trees, at the respective ages, twelve, sixteen, and twenty years, to defray every expence the planter has been put to, with the clear profit of 676 trees per acre, which at the age of twenty-six years may be fairly computed to be of the value of 1s. 6d. per tree, or nett profit, £50. 17s per acre, besides the pleasing reflection of its being of the utmost utility to the poor, by lessening the price of fuel; the addition it makes to the beauty of the country, and the certainty of lowering the price of timber, and upon such a barren spot and soil as could not be turned to any other advantage or benefit whatever. I am so thoroughly convinced of the good consequences attending this method of planting upon this soil, that I have now several hundred thousand

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of Scotch Fir plants, raised by myself, in my nursery beds, which I shall plant out when of a proper age and season.

Gentlemen, if this should meet with your approbation and encouragement, it would add very much to the pleasure I have for many years experienced, and be considered as the greatest honour conferred on,

Gentlemen,

With the greatest respect,

Your most humble servant,

FRANCIS MOORE.

By

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By Plans annexed to the foregoing account, it appears, that

	Trees
19 Acres were situated in the parish of Wavendon, in the county of Bucks - -	51,376
1 In the parish of Aspley-Guise, in the county of Bedford - - - -	2704
1 Wavendon, in Bucks -	2704
1 In Aspley-Guise, in Bedfordshire - - - -	2704
<hr/> 22 acres	<hr/> 59,488 <hr/>

N.B. A plan of that part of the above plantation which is situated in the parish of Wavendon, and called Brown's Wood, along with a further description thereof, will be found in the 23d Volume of the Society's Transactions.

*The Thanks of the Society were ordered to
Dr. William Fordyce, for the following
Communications.*

25th January, 1776.

SIR,

I ordered a bushel of my Siberian Wheat, that grew on my farm at Hyacinth-Hill, Wandsworth Common, to be left for you, that it might be weighed, compared with our Autumnal or Spring Wheat, ground in one of the Society's mills, and some of it baked into wheaten and parliament bread, and the goodness of it ascertained, now that this seed has been cultivated in England three seasons. I was favoured with the seed, of which this is the produce, by Mr. Farmer Duckett, so well and so deservedly known and respected.

The ground on which it was sown, was first turned up from common ground, in 1764 (being at that time full of alternate

nate

nate clay and gravel pits, or covered with thorn and furze), since which period it has been alternately under crops of Wheat, Turneps, Clover, Oats, or Tares, till July 1774, when a crop of Tares was cut off from it, and made into Hay. After a good coat of compost, made in the farm-yard, of loam, fern, horse and cow dung was laid on it, we ploughed for Turneps, which were sown by the 20th of August, and they were then taken off the ground, at five guineas per acre, by the cow-keepers of Southwark, about the middle of March, 1775.

Between the 25th of March, and the 4th of April, we sowed two bushels of the Siberian Wheat per acre, on four or five-bout ridges, laying it down with Red Clover, Dutch ditto, and Rye-Grass Seeds, in the usual quantities. As it is now only threshing out, I cannot speak of the product but by the tythe, which makes it two quarters per acre; it was reaped

with a sickle, on the 7th and 8th of August. On the 20th of September it shewed as fine a crop of Red Clover in flower, as ever was seen, and was mowed for clover hay, yielding by the computation of my gardener and labourers, one ton and half per acre, besides ten days cut clover for my three cart-horses from five acres. When it stood in the ear, the furrows of the ridges were not to be distinguished from the tops of them, so full were they of the Wheat, as if the whole surface had been level.

As fodder is often scarce in many parts of England, in the neighbourhood of London, or other large towns, even where manure is plentiful, perhaps it would be a grain to lay down grass-seeds with, preferable either to Oats, Barley, or Spring Wheat ; as in good ground and favourable seasons, it would at least help young stock through the winter, besides furnishing a crop of good clover to feed your working
horses,

horses, in the autumnal seed time. If you think proper to lay this information before our most respectable and useful Society, I leave it in your power to do so, and remain,

Yours, &c.

WILLIAM FORDYCE.

P.S. I have kept two saddle-horses since October last, on boiled Clustered or Surinam Potatoes, instead of Oats, unless when they have gone beyond the five or six mile stone; and have raised such a quantity of this sort of Potatoes, in lazy beds, on the deepest clay ground, as I will not affirm to you, unless the witnesses to the facts were present, but believe an acre of ground properly cultivated with them, will pay better than any crop about London, provided they are applied to the feeding of horses, instead of corn, and which food (a quarter of a peck per day) will probably subject the
half-

half-bred horses, that stand in London stables, to less degrees of the grease than oats.

Mr. More.

Twenty Pounds being the Premium offered for cultivating Turnep-rooted Cabbage, was adjudged to Mr. Lewen Tugwell, of Beverstone, in Gloucestershire, in the Year 1777.

Mr. Secretary,

LAST year I was successful in cultivating the Turnep-rooted Cabbage, for the raising ten acres of which, the Society for the Encouragement of Agriculture, &c. offers a premium of twenty pounds. As my field is about thirteen acres, upwards of ten of which, I have the greatest reason to believe, was exceedingly good in its kind, I take the liberty of endeavouring to avail myself of such the Society's generous proposal.

In

In consideration of the very great and singular utility the plant (if generally adopted) might be of to the natives of this kingdom, of which (situate in barren part of it) I humbly conceive my cultivation and success simply amount to proof indubitable ; I presume it may be right in me to trouble you with a concise account of some obstacles I therein met with, as it may serve to evince how easily practicable, on trial, the culture will always be, with others not liable thereto.

The field on which my plantation was made, is what, among our lands, we reckon a good sandy loam ; but being the year before under wheat, the property of my predecessor, came to my use exceedingly impoverished, and in the most filthy condition of any I ever had seen ; and as, prior to my undertaking, it had received two fallowings, cutting each other transversewise, the whole was thrown into clods
of

of about nine inches square, and these so matted with roots of couch-grass, &c. that after repeated hoeings, I found the reducing of them quite impracticable ; otherwise, and had I moreover been better served by my seedsman, my crop, I have every reason to believe, would have been abundantly greater than it was. However, having, in a very aukward manner, with ploughs, drags, &c. tumbled these clods about, I at Midsummer gave the field about twelve cart-loads of farm-yard dung to an acre, and immediately ploughed it on to one-bout ridges, and in the middle of each covered up the dung. On each of these I immediately, at two feet distance from each other, set out a row of plants from the seed-bed, which had been sown about eight weeks before. When I thought they were sufficiently rooted, I gave them a hand-hoeing, to which immediately succeeded a horse-hoeing, by the common swing plough, fetching on either side a
furrow

furrow from each row, and throwing it into the middle of the intervals; and this being in due time returned back again to the plants, the cultivation was completed. After this they soon began to flourish surprizingly, threw out an amazing luxuriance of their foliage, and at intervals continued growing throughout the following winter.

Toward the middle of April, when the common turneps, rape, &c (after a very severe winter) were all consumed, and many of my neighbours flocks, in consequence thereof, in the greatest distress imaginable, I turned in my Tegn (or one-year-old sheep), ewes, lambs, &c. to the amount of upwards of four hundred, and had every reason to be pleased with the effect; refusing their hay, they fed wholly on the turneps, and having continued between five and six weeks, went off greatly improved.

Some time after the first had been introduced, three hundred Tegn more were brought

brought on, from the singular severity of the season, in a very starving condition, the property of a neighbour, who at its commencement had greatly ridiculed my procedure. These remained not quite a fortnight, however, without any assistance from hay, &c. went off likewise very much amended.

About the 18th of May I turned them all to their pasture, hauled great quantities of the roots, in high perfection, to adjoining avenues for manure, and at a very late season sowed the field with barley, and notwithstanding the remarkable inclemency of the weather, during almost the whole of the summer afterwards, have, from this easy eligible mode of cultivation, and consequent soiling of the sheep afterwards, a return of almost three harvest loads from an acre, throughout the field.

I am, Sir,

With the greatest esteem,

Your respectful claimant, &c.

Oct. 15, 1777.

Mr. More.

N.B. As

N. B. As the number of our sheep has always been governed by what we have hitherto been enabled to support during the ordinary exigencies of the spring, it is more than probable, was this plant generally received, our flocks might be considerably increased, the arables proportionally benefited thereby, and many fatal consequences, resulting from an absolute want of food at that season, radically prevented.

This our farmers now perceive and acknowledge, and with one consent giving in their testimony and approbation of the culture of this vegetable, have some of them, from my late success, already begun to put it in practice.

Thirty

Thirty Pounds being the Premium offered for an Account of the Culture and Uses of the Turnep-rooted Cabbage, were equally divided, in the Year 1780, between Mr. Lewen Tugwell, of Beverstone, and Mr. Thomas Robbins, of Bowldown Farm, near Tetbury, in Gloucestershire, from whom the following Letters were received.

SIR,

HAVING by me the Society's description of models, machines, &c. I have observed on the lists of donations therein, that it is no uncommon thing for a person to be honoured with a second premium, for a matter of a similar nature with that for which he had received a former gratuity. Hence, after gratefully acknowledging their last year's favour, for cultivating Turnep-rooted Cabbage, I am encouraged to submit to the consideration
of

of the Gentlemen of your Committee, an account of my having again attempted, and succeeded, in the raising that article.

The field for this second experiment consisted of only eleven acres; and as my farm, when about two years ago I entered on it, was in general filthy, and greatly impoverished, and as I make these take a part with the common turneps, in recovering the most worn-out quarter, the crop was not so large as that of the preceding year. This, however, I chiefly impute to the summer's having been wet and cold in an almost unheard-of degree, whence the land could not receive the benefit by previous fallowings it might otherwise have done. My seeds were furthermore again most execrably bad, and great numbers of the plants of a spurious worthless species; but for this I have now a remedy, in raising them myself, from roots selected for that purpose.

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The stock it maintained consisted of two hundred and twelve tegs, or one-year-old sheep, which it sustained in a most desirable way, during the term of five weeks, and two hundred couples, or ewes with lambs, for upwards of three weeks besides. These last, however, were suffered once a day, to have a run in an adjoining grass-plat, whereby we find the lambs in particular do much better than when confined to the turnep-field solely. The juices of the plant are certainly rich, but its bulb being of a solid substance, does not supply the milk of the ewe in such quantities, and so frequently as is necessary.

Intending the land for barley, I thought it would be imprudent to wait longer than about the 18th of May, when I had a great many loads of the roots hauled to the aforesaid grass-plat, where the tegs, pasturing, continued at intervals feeding on them until Midsummer, and it was
observed

observed by my neighbours, that although they enjoyed their fill of fine grass, they were seldom known to lie down any where else than among the turneps, while any of these remained unconsumed. This I cannot but consider as a happy proof of the partial fondness the sheep have for this excellent root; and, in respect of its effects on them, I declare I have hitherto experienced no plant so fattening, or that will keep the creatures in more perfect health.

The process of my plantation was conducted the same as formerly, that is, the land, having been previously fallowed and dunged, was thrown on to one-bout ridges, and at two feet distance from each other, a single row of plants set out on the top of each; at proper seasons the intervals were afterwards horse-hoed backwards and forwards, and in consideration of great numbers of weeds, accruing from the wetness of the summer, the tops of

the ridges received two dressings of the hand-hoe. All of these, together with the subsequent soilings of the sheep, left the land in admirable condition; and about the 18th of May, as before mentioned, I sowed the field with Barley, and reaped a return of a rich and luxuriant crop, in quality remarkable fine.

From incontrovertible facts relative to its utility, this species seems, in this neighbourhood, even to the distance of many miles around, to gain ground apace; and some of my neighbours, who on account of their ideal notions of the expense attending its cultivation, when first introduced, decried it at large, positively asserting no benefit could ever accrue from it to the owner, I have reason to believe will, ere long, be fully convinced of the impossibility of doing things entirely well without it.

We now find the expense (horse-hoeing excepted) to vary but little from that
usually

usually attending the raising the common turnep; and in consideration of the comparative superiority of its quality, the greater certainty of the crop succeeding (which with those, on account of the fly, is always precarious), its hardiness also in resisting every degree of frost, and the benefit the soil eminently obtains from the cultivation, I humbly conceive the plant, in point of real value, to stand but very little, if any, behind that species. It is moreover, as a valuable consideration, to be observed, that, while feeding on these, no consumption of hay has with us as yet been made; our sheep indeed are often served therewith, but they are always as sure to reject it; and it may, not unlikely, some time or other be found, that these, on account of their singular permanency, may be equal to supporting the animals as well without hay, as the others with the addition of that expensive article; whence, in future, I intend practising the culture on a much larger scale. I now,

on condition of their proceeding in due form, furnish my neighbours with seed gratis; and it is, perhaps, worthy of remark, that on an extreme cold day in February last, I had not less than four orders for Turnep-rooted Cabbage Seeds. Our method of feeding consists in pulling up the Turneps with a hook properly made, which having an edge on its back part for that purpose, each root, at a single stroke, receives an incision through the middle; hence, their external surface being very hard, the sheep feed on them with much greater facility than they would otherwise do. Many other observations in favour of this plant remain yet to be made, but which, however, time and experience only must furnish.

My neighbour Robbins also intending this year to send up his claim for the premium, I the other day gave him a certificate, authenticating the contents thereof.

His

His method of giving the lambs a backward run on rye-grass, is certainly deserving of imitation, and wherein I should have followed him, if I had had any in the vicinage of my plantation. Perhaps no other gramen, at that early season (the burnet excepted) will ever, for producing milk in the ewe, be found equal thereto,

I am, Sir,

Your truly obliged, and

Beverstone,
Oct. 21, 1778.

obedient humble servant,

LEWEN TUGWELL,

Mr. Secretary,

IN consequence of the success of my neighbour, Mr. Lewen Tugwell, who last year obtained of your Society the premium offered for cultivating the Turnep-rooted Cabbage, I am also this year induced to profess myself a claimant.

Considering that the views of the Society extend to nothing less than the good

of the community at large, I am happy to inform you, that from observing the great advantage that accrued from Mr. Tugwell's experiments, I last year attempted the cultivation, and succeeded beyond my most sanguine expectations.

Situate on a farm where my late predecessor (though a reputable husbandman) had in vain attempted the raising a breeding flock, I had myself despaired of doing it, and resolved to sell all my ewe sheep, and to keep none in future but of the wether kind ; however, having obtained the knowledge of this most valuable plant, my schemes have now fallen into a new channel, being enabled to keep them in all desirable health through the spring season (wherein, as had been conceived, consisted an absolute and unsurmountable difficulty), I now am not only gratified with the pleasing sight of ewes and lambs about me, but from the present appearance of these (being descended

scended from the best rams I could procure) am not without hopes of possessing, ere long, a flock equal to any in my neighbourhood, even those pasturing on its most fertile meadows.

In the cultivation I thought I had only to follow Mr. Tugwell's simple method, that is, of disposing the plants on the top of one-bout ridges, and subsequently horse-hoeing the intervals backwards and forwards; and it is remarkable (notwithstanding he informed me, from the little experience he has had, that he believes the plant will be found to succeed best on land rather loamy or heavy) that on a plantation of eleven acres of a stony soil, light in an almost unparalleled degree, I was enabled, through the difficult season of the last spring, to sustain and preserve, in the most desirable manner, two hundred and ten ewes, with two hundred and twenty lambs, for a month; also with the refuse or bottoms, such as the ewes and
lambs

lambs left, I kept one hundred and eighty tegs, or one-year-old sheep, during the space of six weeks. However it must be acknowledged, and is indeed proper to intimate, that although during their stay thereon I gave them no hay, I nevertheless found it eligible to let the ewes and lambs have a backward run on a small adjoining field of rye grass ; for from the time of their being brought on, I had observed, that although the ewes appeared to increase in flesh, the lambs were rather behind in that respect ; and herein I was happy in the concurrent opinion of Mr. Tugwell, who from his last year's experience had hinted to me, that he thought the plant in its nature rather tended to fatten animals, than to supply milk ; it is true my rye-grass was very trifling in respect of quantity, having been fed the preceding winter ; however it had a very desirable effect, and from the time of their being introduced thereto, the lambs were observed to recover.

Previous

Previous to my setting out the plants, the field had, the same season, been under vetches, which were soiled, or fed off, with sheep. I then ploughed it, gave it some dung, and threw the land into its proper form for planting. At Midsummer the plants were set out, at about eighteen inches asunder in the rows, and the rows, or ridges, about thirty-six inches apart. As soon as the weeds began to spring up, and I observed the plants wanted some assistance, I had them hand-hoed. Some time after I sent my ploughs to throw up a ridge in the intervals, which, after remaining as long as was necessary, was thrown back again to the plants. I some time after that gave them another hand-hoeing, by which means my land was put in the finest tilth imaginable, and the plants had all the assistance requisite.

In the spring, intending to sow the land with barley, I was necessitated to
haul

haul off several loads of the roots, and although my seed was not committed until the 14th of May, and the season proved remarkably dry after, it is an indisputable fact, that I reaped near three loads from an acre, which extraordinary increase, as I impute it to the superior mode of cultivation, would, with me, always be some inducement to the propagation of this most valuable vegetable, even if I had no further views therein.

I am, Sir,

Yours most respectfully, &c.

THOMAS ROBBINS,

P. S. I have the pleasure to inform you, that the cultivation of this most excellent plant bids fair to become general in this part of the country, as many of our principal farmers have some of it growing this year, and after having given it a fair trial, I presume they will be fully convinced of its utility, and continue the culture of it.

SIR,

Beverstone, March 3, 1779.

SIR,

YOURS of the 1st of February I have now before me, with the queries relative to my last year's Turnep-rooted Cabbage. The seeds sown the preceding spring were not committed (occasioned by an accident) until the 9th of May, a period, as I then considered it, a fortnight too late; but, for reasons that will occur in answering the other queries, it is now a maxim with us, that in such situations as ours, if no accident forbids it, they should be sown before the middle of April.

As the earth of the seed-bed ought to be good, and as free from seed weeds as possible, I have for these reasons, and for security against casual depredations, usually sown my seeds in a garden, but not on a hot-bed, there being always time enough in the spring for raising the plants to a size sufficient for setting out from the natural soil.

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will be executed in any given time, when the season, or weather, or both, shall arrive most proper for the business, and that at a time of the year, when labour in husbandry is always very valuable.

The plants too, situate in or near the field, when drawn, will not lie so long out of the ground before they are replanted, and therefore be the less liable to injury from their removal.

The excrementitious exhalations arising from the earth, and compost heaps adjoining, will also prevent the depredations of the fly; however this species, it is observable, is seldom so obnoxious there-to, as any other of the Turnep or Cabbage kind. In whatever situation we perceive an attack made on these or any others, if wood ashes are to be obtained, we always find a preventive in scattering them lightly over the plants in the dew of the morning. Some have had recourse to the tedious maxim of dipping their
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their roots, when first drawn, in a prepared mud, or mixture of earth and water, to preserve them from the injuries of the external air, but, from experience and repeated observations, we find the species so hardy, that, if when replanted the earth is well closed about them, there is certainly no occasion for it. However, when first set out, it is necessary for a boy to defend them a few days from the crows and rooks; the sagacity of these creatures (from seeing the plants in a withered state) leading them in quest of a supposed destructive insect at its root, they will frequently, without the aforesaid precaution, draw them up again much faster than they were planted. In regard to transplanting from the seed-bed before we set out for the last time on the ridges in the field, I at first had recourse to that method; but finding it tedious and expensive, have not practised it since. However, if no remedy can be found, I must soon return to it again;

again; for the plants standing too near together on the seed-bed, together with seed-weeds, which it is frequently difficult to prevent, they are generally drawn up in a trunk, or stalk, so long and weak, that when planted out, they never regain their natural shape. I intend this spring to sow in drills about a foot apart, whence by the action of the external air, with the hand-hoe occasionally moving among them, I apprehend the above-mentioned evil may be obviated; a frequent removing the earth of the intervals, and of the roots growing therein, will probably, in effect, be a partial transplanting. My crop of last year was planted out on the ridges about three weeks after Midsummer; but, as an instance of the impropriety of being too late, I have a neighbour who, in his first attempt, has this year seven acres that were planted some time before Midsummer; I have also upwards of fourteen acres, which, as I waited for rain, were not planted until

six or seven weeks after his; and as the drought continued with us till near the equinox, the consequence is, mine on an average are not more than a pound and a half in weight, while his are probably nearly five pounds. Situated high and cold, with lands none of the richest, if we were sure of weather proper for the business, Midsummer might notwithstanding be soon enough for transplanting to the field; but as that is precarious, we ought at all events to get the plants set out, rooted, and growing, by that time. The average weight of my last year's crop was probably about three pounds; some few amounted to six, seven, and even eight pounds each; and it was observable, that on part of the field planted three weeks before the other part, the roots were much the largest. The ewes and lambs were turned in upon them the 9th of April, and drawn off the 2d of May. The one-year-old sheep were introduced April the 13th, and taken away the 18th of the following

following month. The grass-plat on which the ewes and lambs were occasionally suffered to pasture, is about eighteen acres, half of which, however, would have been very sufficient; for after all, a great deal consists in their having a turf to enjoy themselves on. Young lambs, in whatever case, confined with hurdles on an arable field, are seldom known to do well. The most eligible method of any I have an idea of, would consist in hauling the roots, some time in April, entirely off from the field whereon they grow, and throwing them promiscuously about on some adjoining pasture, or field of rye-grass, clover, &c. (to be sown with wheat the ensuing season) in either of these situations to let the sheep be regularly introduced to them, with hurdles, as they would otherwise have been on the arable. The roots, I humbly conceive, would be much the better for such management, in that they would be prevented from throwing out their juices into leaves and branches,

and the land whereon they grew, might in consequence, in the proper season, be sown with barley, the want of which, I am persuaded, may otherwise prove the most insurmountable obstacle to the general cultivation of this most opportunely serving and valuable plant.

I am, Sir,

Your most obedient humble servant,

LEWEN TUGWELL.

The Gold Medal, being the Premium offered for planting Lucerne, was adjudged to John Pratt, Esq. of Poorfleet, Essex, from whom the following Account was received, 1780.

My Lords and Gentlemen,

AGREEABLE to the design of the Society, and as a candidate for your premium for an account of the cultivation and produce of Lucerne, I take the liberty

ty to lay before you the following experiments and observations. In a field of good hazle loam, neither too light, nor too stiff, the soil about three feet deep, with a chalky bottom, the land inclining to the north-east; the soil of the lower part of the field is stiff, tending to a clay; I do not know whether any chalk lies under this part, but the plants do not shew any difference from the soil.

The field, in 1773, had borne turneps, properly hoed and fed off with sheep, and on April 13th, 1774, after the land had had two ploughings and harrowings, the ground being fine, began to sow in drills, twenty inches distant, by a line, on two acres, and used about twelve pounds of seed, that is, six pounds on each acre, and covered the seed with a garden rake.

In May and June the fly made great havock, so that at different times the sowing

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and hoeing were repeated until the 5th of July, when the rows were complete, and those parts that were not damaged by the fly, were in a thriving state; on the 30th of July began to cut, and by the 20th of September, it had been cut all over once. The latter end of October laid ten load of rotten dung on each acre, and, with a small plough, turned the earth each way out of the alleys, over the plants, so that the land appeared like a fallow.

1775. In this state it lay until the 20th of February following, when it was bush-harrowed cross-ways, to lay the ridges down into the alleys again.

In April mended some trifling places. May 27th began to cut, it being then about twenty inches high,

June the 30th. Began to cut the second time, and followed this cutting with a horse-

horse-hoeing in the alleys, and hand-weeding in the rows.

August the 7th. Began to cut the third time.

September the 26th. Began to cut the fourth time.

November the 6th. Dunged and ploughed as in the last year.

1776. The weather being wet, could not bush-harrow until the 12th of March, and on the 27th, as the plants grew fast, gave it a perfect hand-weeding in the rows. Began cutting in May, and during this summer cut four crops, horse-hoeing the alleys each time of cutting; hand-weeded again in September, and in November dunged and ploughed the alleys as last year.

N.B. In May this year sowed near two acres more, adjoining to the above piece, which land had the preceding winter borne cabbages, which were taken off be-

fore Christmas, and the land then ploughed and prepared for sowing.

The plants came up well, and no accident happened from the fly; cut this sowing once this year, and cultivated them as the other Lucerne.

1777. February the 28th. Levelled the ridges with a bush-harrow. May the 22d. Began to cut, and cut four crops this summer, horse-hoeing after each cutting. Hand-weeded the rows in October, and in November dunged and ploughed the alleys as before.

N.B. In May this year added seven rows to make out the quantity four acres. These came up well, except one row, which, in all probability, by neglect, was not sown. The six rows were cut once, and treated as the former young plants.

1778. February. Harrowed down as before. May the 4th began cutting, and cut
four

four crops this summer. The last cutting was finished the 30th of October, when the land was treated as in the former years.

From various causes, owing principally to an obstinate servant, no account was kept before this year, what cattle it would maintain; but this year the four acres kept eleven horses from the 4th of May to the 31st of October, they having only half their usual allowance of corn, and yet they improved much. There were likewise three additional horses fed from the above Lucerne seventy-four days.

1779. February. Bush-harrowed as usual. May the 7th. Began to cut, and fed ten horses. May the 21st. Added two horses; but before the whole of the four acres were cut, the part where the cutting began had grown so luxuriantly, as to be in flower; twenty-one additional horses were therefore added, and fed during seven days,

days, before we began to cut the second time, which was on June the 24th.

August the 5d. Began to cut the third time.

September the 9th. Began to cut the fourth time.

The plants continued growing in such a manner, that by the time the whole four acres had been cut over, which was done by the 10th of October, the part first cut was grown twelve inches high. It being then too late in the season for another cutting, fifteen head of horned cattle were turned in for eight days; then gave it a hand-weeding; dunged and ploughed as before.

The produce this year maintained ten horses twenty-two weeks, two horses twenty weeks, twenty-one horses one week, and fifteen head of cattle eight days.

OBSERVATIONS.

The land which bore cabbages preferable to that which bore turneps, being much cleaner.

May

May is a proper month for sowing ; hand-hoeing and weeding are requisite the first year, as the plants are too tender for the horse-hoe. Cutting once only the first year, gives the roots time to shoot down and gather strength.

Horse-hoeing the alleys after every cutting, and hand-weeding the rows in March or April, are necessary ; but before it is laid up for the winter, should not on any account be omitted. After the last cutting and weeding, let ten or twelve loads of rotten dung be laid on each acre, and gathered up with a small plough, to form the ridges over the crowns of the roots ; nothing more is necessary until the first dry day in February, then bush-harrow the ridges down into the alleys.

The third year the plants appear to arrive at their perfection, as I do not perceive

ceive they have improved or diminished since that time.

Neither does dry or wet weather materially affect its growth, as I observed by frequently tying a silk thread on some plants. It grows about an inch a day, but something less if the weather is cold.

This grass has the effect of salt-marshes; it purges, and is diuretick for three or four days, and then fattens horses at a great rate, although hardly half the usual allowance of corn is given.

Sheep should not be permitted to bait on it, as they will scoop the crowns of the roots, and destroy those buds that are formed round the crowns for the succeeding crop; but that is not the case with horned cattle.

The drills of the first two acres were made by a line and a hoe, but the drills of the last two acres were made by taking out the teeth of a horse-rake, and fixing
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in some angular teeth, like the angular chissel of the wheelers, at twenty inches distant, which performed the work well; and the last two acres were done for half the expense of the first two acres.

CHEMISTRY.

Premiums for Discoveries and Improvements in Chemistry, Dyeing, and Mineralogy.

114. KELP. For the greatest quantity, not less than four tons of Kelp, containing a much larger proportion of Alkaline Salt than any Kelp now made for sale; the gold medal, or twenty pounds.

A specimen of one hundred weight, to be produced on or before the first Tuesday in January, 1784; together with Certificates that the whole quantity is equal to the specimen, and made in Great-Britain or Ireland, of Sea Weed.

115. BARILLA. For the greatest quantity of merchantable Barilla, not less than half a ton, made from Spanish Kali, raised in Great-Britain; the gold medal, or twenty pounds.

A sample of not less than twenty-eight pounds, with a Certificate that half a ton
has

has been made, to be produced on or before the first Tuesday in January, 1784.

116. NATIVE FOSSIL FIXT ALKALI. To the person who shall discover in Great-Britain, Ireland, or the British Colonies, and bring into the port of London, in the year 1783, the greatest quantity, not less than two hundred weight, of the Native Fossil Fixt Alkali, fit for the purposes of the soap-makers ; the gold medal, or thirty pounds.

A sample, not less than fifty pounds weight (as got out of the earth) with Certificates describing the place where found, and the quantity brought in, to be produced on or before the first Tuesday in January, 1784.

117. NATIVE FOSSIL FIXT ALKALI FROM THE EAST INDIES. To the person who shall import into the port of London, in the year 1784, the greatest quantity, not less than half a ton, of the Native Fossil Fixt Alkali,
fit

fit for the purposes of the soap-makers, being the produce of any part of the British possessions in the East Indies ; the gold medal, or thirty pounds.

A sample, not less than fifty pounds weight, with proper Certificates, to be produced on or before the last Tuesday in January, 1785.

118. FOSSIL FIXT ALKALI. For discovering the best method of obtaining from sea salt, the Natron, or Fossil Alkali, in a pure state, fit for the purposes to which Fixt Alkaline Salts are applied, and at an expense that will not render it too dear to be used in bleaching, soap-making, dyeing, and other great works, where pearl-ash, pot-ash, barilla, or kelp, are now employed ; the gold medal.

A sample of fifty pounds weight, and Certificates that two hundred weight at least had been manufactured by the candidate, to be produced on or before the third Tuesday in December, 1783.

119. PRE-

119. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the seeds of plants in a state fit for vegetation, after having been kept a considerable time, such method being superior to any known to the publick, and verified by sufficient trial; to be communicated to the Society on or before the first Tuesday in December, 1783; the gold medal.

120. POPPY SEED, FOR OBTAINING OIL. To the person who shall cultivate the greatest quantity of land, not less than ten acres, with White Poppies, for the purpose of extracting oil from the seed; the gold medal, or twenty pounds.

CERTIFICATES of the quantity of land sown, and of the seed produced, and also that the whole of the seed has been used for the purpose of extracting oil from it; to be delivered with a sample of not less than two gallons of the oil, and an account of the proportion of oil obtained

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from the seed, on or before the third Tuesday in January, 1784.

N.B. The Society have been informed that the oil of Poppy Seed is not only proper for the use of painters, but equally palatable, wholesome, and fit for the same purposes as the best olive oil.

121. DESTROYING SMOKE. For the best account, ascertained by proper experiments, of a method of destroying or burning the Smoke of fires belonging to Steam Engines, Furnaces employed in calcining or smelting metals, or other large works, in order to prevent annoyance to the neighbourhood; to be produced on or before the first Tuesday in January, 1784; the gold medal.

122. SUBSTITUTE OR PREPARATION OF YEAST. For discovering to the Society an effectual Substitute for Yeast, or Preparation of Yeast, for fermenting liquors, and raising bread, that may be preserved for use, better than any hitherto generally

generally known; the gold medal, or twenty pounds.

Specimens of the Substitute, or of the Preparation of Yeast, sufficient for trials, together with a paper sealed up, and containing an account of the composition of the Substitute, or method of preparing the Yeast, to be produced on or before the last Tuesday in November, 1783.

123. INCREASING STEAM. To any person who shall discover to the Society, a method, verified by actual experiments, of increasing the quantity, or the force, of Steam, in Steam Engines, with less fuel than is usually employed, provided that in general the whole amount of the expenses in using Steam Engines may be considerably lessened; the gold medal.

To be communicated to the Society on or before the first Tuesday in January, 1785.

N.B. As it is well known there are methods of preventing the ebullition of liquids, by the addition of particular matters in the boiling, it is submitted to the consideration of the ingenious, whether by the addition of some matters, or by some mechanical operations, the boiling and evaporation may not be increased.

124. METHOD OF COMPARING SWEETS. To the person who shall discover to the Society an Index, or practicable method of comparing, measuring, and ascertaining the degrees of Sweetness in Saccharine Substances; the gold medal.

To be produced on or before the first Tuesday in January, 1784.

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The Silver Medal and Ten Guineas were given to Mr. Clegg, for his Discovery of a Substitute for Verdigris, in Dyeing Black, in the Year 1782, of which the following is an account, drawn up by himself.

MANY articles which are in daily use, both in dyeing and other arts, have been found by chance to be necessary, yet sufficient pains have not been taken to ascertain the principles upon which they act; of this number is Verdigris; and as this article was imported to us, at a very great expense, from France, I was induced some years ago to undertake a course of experiments to investigate the manner of its operation, and from thence to find, if possible, an effectual substitute, cheaper and nearer home. On adding Verdigris to the common ingredients of the black dye, (viz. astringents and martial vitriol) the first thing remarkable is,

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that

that a quantity of iron is precipitated; for the pieces of Verdigris will be covered over with the crocus of iron, almost instantly, and a quantity of the copper of the Verdigris is at the same time taken up by the disengaged acid; as appears by the copper coat a knife receives on being held in the liquor: so that the vitriolic acid leaves the iron, with which it was combined in martial vitriol, and unites with the copper of Verdigris, and again leaves the copper to unite with iron in its metallic state. The same decomposition happens with lead, if *saccharum saturni* be made use of instead of Verdigris, though lead, according to the received doctrine of elective attractions, has a still less affinity with iron, than copper has. In fact, I find that *saccharum saturni* will answer nearly the end of Verdigris, and though, as a substitute to it, we could reap no advantage from it, yet I think it gives us an insight into the principle

ciple upon which Verdigris is of use in the Black Dye, viz. by uniting with part of the acid of the vitriol, and giving the astringent matter of the vegetable an opportunity of forming an ink with the precipitated iron in greater abundance, and more expeditiously, than it could otherwise do. Believing this to be the true manner of its operation, I went to work upon this principle, and substituted *alkaline salts* in the room of Verdigris, as I imagined these would be a much more innocent as well as cheaper ingredient; for the acid, or the corrosive metallick salts, are the only hurtful ingredients in the dye, and the alkali in proper proportion will unite with the superabundant acid, and form an innocent neutral salt, *vitriolated tartar*. Upon the first trials, I was satisfied of the truth of my conjectures; for in all the experiments which I made in the small way, the ashes answered at least as well as the Verdigris: but in real practice, in the

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large, I found myself deceived ; for upon dyeing a kettle of hats of twenty-four dozen, though the colour came on surprisingly at first, yet the liquor soon became weak. I made many experiments, which it is useless here to relate, until I united vitriol of copper with the alkali, which, upon repeated trials, has been found to answer perfectly the end of Verdigris. The following, I believe, will be found to be the just proportions, though there is some difference in the practice of different dye-houses.

Saturate two pounds of vitriol of copper, with a strong alkaline salt (American pot-ashes, when to be procured, are recommended). The vitriol will take about an equal weight of dry ashes. Both the vitriol and the ashes are to be previously dissolved apart. When this proportion is mixed, well stirred, and suffered to stand a few hours, a precipitate will subside. Upon adding a few drops of the solution of
ashes,

ashes, if the mixture be saturated, the water on the top of the vessel will remain colourless; but if not, a blue colour will be produced; upon which add more ashes; there is no danger in its being a little over-saturated with ashes. Take care to add the solution of ashes to that of vitriol by a little at a time, otherwise the effervescence which ensues will cause them to overflow the vessel: these four pounds of vitriol of copper and ashes, will be equal to about the same weight of Verdigris; and should be added to the other liquors of the dye, at different times, as is usual with Verdigris.

The black, thus dyed, will be perfectly innocent to the goods, rather tending to keep them soft, than corrode them, particularly hats, in which there is the greatest consumption of Verdigris.

For those who are constantly using Verdigris, it would be proper to have a vessel always at hand, containing a saturated solution

lution of vitriol of copper; and another, with a saturated solution of ashes, ready to mix as they are wanted; for I find they do not answer so well if long kept.

JAMES CLEGG.

Manchester, Dole Fields,

January 14, 1782.

Premiums

Premiums for promoting the Polite Arts.

125. HONORARY PREMIUMS FOR DRAWINGS. For the best drawing of any kind, made with crayons, chalk, black lead, pen, Indian ink, or bister, by young gentlemen under the age of twenty-one, sons or grandsons of Peers, or Peeresses, in their own right, of Great-Britain or Ireland; to be produced on or before the first Tuesday in March, 1784; the honorary medal of the Society in gold.

126. The same in silver for the second in merit.

127, 128. The same premiums will be given, on the like conditions, to young ladies, daughters, or grand-daughters, of Peers, or Peeresses, in their own right, of Great-Britain or Ireland.

129. HONORARY PREMIUMS FOR DRAWINGS. For the best drawings of any kind, made with crayons, chalk, black

black lead, pen, Indian ink, or bister; by young gentlemen under the age of twenty-one.

To be produced on or before the first Tuesday in March, 1784; the gold medal.

130. For the next in merit; the silver medal.

131, 132. The same premiums will be given for drawings by young ladies.

N.B. Persons professing any branch of the Polite Arts, or any business dependant on the arts of design, or the sons or daughters of such persons, will not be admitted candidates in these classes.

The following Premium is offered in conformity to the Will of the late John Stock, of Hampstead, Esq.

133. MODELLING FROM THE LIFE. For the best model of a head in clay, from the life, and of the dimensions
of

of nature, by persons of either sex, a silver medallion of the value of three pounds, with the following engraved inscription: *The premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

To be produced on or before the third Tuesday in October, 1783.

134. DRAWINGS OF OUTLINES.

For the best Outline after an original group or cast in plaster of human figures, by persons of either sex under the age of sixteen, the principal figure not less than twelve inches; to be produced on or before the last Tuesday in October, 1783; the greater silver pallet.

135. For the next in merit; the lesser silver pallet.

N.B. These drawings are to be made on paper with chalk, black lead, Indian ink, or bister, and the originals either to be

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be produced to the Society, or to be referred to for their examination.

136. DRAWINGS AFTER PICTURES. For the best drawing after a Picture of a Group of human figures, the principal figure not less than sixteen inches, by persons of either sex under the age of sixteen; to be produced on or before the last Tuesday in October, 1783; the greater silver pallet.

137. For the next in merit; the lesser silver pallet.

The drawings to be made with Indian ink, chalk, or black lead, and of a different size from the original, which must be produced at the same time.

138. DRAWINGS OF MACHINES. For the best perspective drawing by persons of either sex, under the age of twenty-one years, of the model of Mr. Lloyd's Cyder Mill, or any other machine, of which such a drawing has not been made,
in

in the Society's Repository; the greater silver pallet; to be produced on or before the third Tuesday in October, 1783.

N.B. Such candidates as propose to draw for this premium will be admitted by the Register any day (Sundays or Wednesdays excepted) between the hours of ten and two.

The drawing to which the premium is adjudged, is to remain the property of the Society.

139. DRAWINGS OF BEASTS. For the best drawing and composition of three or more beasts after nature, the principal figure to be not less than eighteen inches, by persons of either sex, under the age of eighteen years. To be made with chalk, black lead, pen, Indian ink, bistre, crayons, or water colours; to be produced on or before the third Tuesday in October, 1783; the greater silver pallet.

140. For the next in merit; the lesser silver pallet.

141. DRAW-

141. DRAWINGS OF BIRDS. For the best drawing and composition after nature of not less than three different birds, to be made with crayons or water colours, by persons of either sex, under the age of eighteen years; to be produced on or before the third Tuesday in October, 1783; the greater silver pallet.

142. For the next in merit; the lesser silver pallet.

143. DRAWINGS OF FRUIT, FLOWERS, or PLANTS. For the best drawing after nature, of fruit, flowers, or plants, to be made with crayons, or water colours, by persons of either sex, under the age of sixteen; to be produced on or before the third Tuesday in October, 1783; the greater silver pallet.

144. For the next in merit; the lesser silver pallet.

145. DRAWINGS OF LANDSCAPES. For the best drawing of Landscapes after nature, by persons of either sex

sex under twenty-one years of age, to be produced on or before the third Tuesday in October, 1783; the greater silver pallet.

146. For the next in merit; the lesser silver pallet.

Each candidate must mention, on the front of his drawing, from whence he took his view; and the drawings must be made with chalk, pen, Indian ink, or bister.

147. HISTORICAL DRAWINGS. For the best Historical Drawing, being an original composition of five or more human figures; the height of the principal figure not less than eight inches, to be made with crayons, chalk, black-lead, pen, Indian ink, or bister, and to be produced on or before the first Tuesday in February, 1784; the gold pallet.

148. For the next in merit; the greater silver pallet.

To the Masters of Academies or Schools.

149. TEACHING LANGUAGES.

Whereas it has been observed that the living languages, or languages spoken in schools, are much sooner acquired than the dead languages, which are only taught grammatically :

The Society, desirous to improve the present mode of education, hereby offer the gold medal to the master of any academy, or school for boys, situated within, or not more than thirty miles distant from London, who shall, within three years from the date of this advertisement, teach the greatest number of scholars, not less than four, to write, and to speak Latin, in common conversation, correctly and fluently.

Also, the gold medal for teaching in the like manner, each of the following
languages,

languages, viz. the German, the Spanish, and the Italian, being commercial languages, not usually taught at schools in England.

The masters who propose to be candidates for the above premiums, are to send notice of their intention to claim them, to the Society, at their house in the Adelphi, on or before the second Tuesday in November, 1786. Soon after which, the Society will appoint a day for examining the young gentlemen, and for adjudging the said claims.

And in order to encourage assiduity in the scholars, whose masters apply for the above premiums, the Society will give to the greatest proficient in each of the said languages, the silver medal.

N. B. Any information for the further improvement of the education of youth in languages, will be thankfully received.

CONDITIONS.

No person who has gained the first premium in any class, will be admitted a candidate in any class of an inferior age ; and no candidate shall receive more than one premium in one year ; nor will they who, for two successive years, shall gain the first premium in one class, be ever again admitted as candidates in that class.

No person shall ever be admitted a candidate in any class, in which he has three times obtained the whole of the first premium.

No candidate shall send in more than one performance in any one class.

All the claims which are produced each year, before the committee of Polite Arts, (to which premiums or bounties are adjudged) are to remain with the Society six weeks after the determination, unless
the

the candidate, for particular reasons, do apply to have the performance returned.

No claim for a premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain a premium, reward, or gratification from any other Society, or any academy or school.

All performances, that obtain premiums in the Polite Arts, must be begun after the publication of such premiums.

Purposely to encourage real merit, and to prevent any attempts to impose on the Society, by producing drawings which shall have been made or retouched by any other person than the candidate, the Society is resolved upon all occasions, with respect to the successful candidates in classes 133 to 148 inclusive, to prove their abilities, by requiring a specimen made under the inspection of the committee of Polite Arts, in every instance where such proof can be obtained.

*Premiums for encouraging and improving
Manufactures.*

150. SILK. For the greatest quantity of merchantable Silk, not less than five pounds, produced by any one person in England, in the year 1783; the gold medal.

Specimens of the Silk, not less than one pound, with Certificates that the whole is of equal quality, and produced in England; to be delivered to the Society on or before the first Tuesday in January, 1784.

151. For the second greatest quantity, not less than two pounds; the silver medal.

152. MULBERRY CUTTINGS. For raising the greatest number of white or black Mulberry Trees, for feeding Silk Worms, not less than three hundred, from
cuttings

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cuttings, in the year 1781, which shall be growing in September, 1783.

CERTIFICATES of such raising and growth, with the manner of culture, to be produced to the Society on or before the first Tuesday in November, 1783; the gold medal.

153. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1784.

154. MULBERRY CUTTINGS. To the person who shall form the largest plantation, not less than one acre, of Mulberry Cuttings, for the purpose of feeding Silk Worms; the gold medal.

CERTIFICATES of the quantity of land, and that the Mulberry Plants are not more than three feet asunder; to be produced on or before the first Tuesday in December, 1783.

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It is proposed, that this plantation be continually kept in a low state, in manner of a shrubbery, to the intent that the gathering the leaves may always be within the reach of women or children.

155. The same premium is extended one year farther.

CERTIFICATES to be produced on or before the first Tuesday in December, 1784.

156. MACHINE FOR CARDING SILK. For the best machine, superior to any now in use, for carding waste Silk, equally well as by hand; to be produced, together with a specimen of the Cardings, on or before the first Tuesday in November, 1783; the gold medal, or twenty pounds.

157. WEAVING FISHING NETS. For the best specimen of plain netting, for Fishing Nets, not less than twenty yards long, and six feet deep, woven in a loom,
or

or other machine ; to be produced to the Society, on or before the second Tuesday in January, 1784 ; twenty guineas.

N.B. It is expected that the specimen produced be made in such a manner, as to be cut and joined without more loss than usual, that it have such a plain selvage as the common fishing nets, and that the knot be equally fast with those in nets in common use, and as easily repaired.

158. PAPER FOR COPPER PLATES. To the person who shall establish in England or Wales, a manufacture of paper, equal to the paper imported from France, proper for receiving impressions from mezzotinto, and other engraved copper plates, and produce to the Society one ream, of the dimensions of the French *super-royal*, on or before the first Tuesday in January, 1784 ; the gold medal, or twenty guineas.

CERTIFICATES must be produced to the satisfaction of the Society, that the paper was made in England or Wales.

The

The thanks of the Society were given to Thomas Butterworth Bailey, of Hope, near Manchester, Esq. for his obliging communication of the following Letters from Lady Moira, and the Specimens of Cloth made from the refuse of Flax, and backings of Tow, according to the process practised by her Ladyship, 1775.

SIR,

I had the pleasure of your letter yesterday by Doctor Halliday. Lord Moira and I, with much satisfaction, desire to be both ranked as subscribers to the *Sylva*, which is to be re-published by Doctor Hunter, whose Georgical Essays have been greatly admired beneath this roof.

As to the factitious cotton I have attempted to introduce the use of, I flatter myself that it is beginning to answer that purpose I had at heart, some alleviation to the miseries of the unhappy beings
that

that surround me, the excess of poverty that reigns here being such, -that in my native land I am persuaded it would not be imagined to exist. The very refuse of the flax, which is called the backings of tow, produces a material that can be manufactured into a coarse but comfortable clothing of the fastian and cotton kind, and this kind of cotton was offered to me last week for sale, at three-pence per pound; it is therefore plain how little pains and expense the manufacturing of it costs. Wool is here almost constantly sixteen-pence a pound, often dearer. The wife makes and spins the cotton, the weaver adds a few more yards of warp to the piece of linen he has in his loom for sale, and clothes his family with little more cost than his own industry. It must appear to you that this manufacture is however best calculated for Ireland, where the consumption of flax must consequently leave such quantities of refuse; for tow
and

and the backings are all I employ, except fired or mildewed flax, both of which (from being ill slaked) being improper for the linen cloth, I have made use of; hemp will also produce a sort of cotton, but it requires infinitely more boiling, and bears a nearer resemblance to wool. It was the codilla that I tried; the backings of that come amazingly cheap, and I believe it will take a better dye than flax.

The main purport in view seemed to me, the divesting the flax of its oil. I tried soap-boiler's lye with very good success, scouring it afterwards to take off any bad effects of the lime used therein. I then had it tried to be scoured like wool, but found it required that the fermented urine in that case should not be mixed with water, and that kelp and common salt were necessary to be added to it. Either of these methods do. The boiling of it might, I am sure, be expedited,

dited, by having a cover to the iron pot, which might keep in the steam ; and care must be taken, as the liquor diminishes, to replenish it constantly. I have boiled some in a mixture of lime-water and salt ; this had a harshness in it that more resembles the crispness of cotton, but the scouring of it would certainly deprive it of that quality, and leaving the lime in, it is confidently asserted here, would rot it. I own I doubt that effect, as I imagine that lime, after it is slacked by water, no longer retains its corrosive quality. In India and China they use it in their washing of linen as regularly as we do soap.

The tow is heckled and boiled in small faggots, tied up by a thread or bit of tow. The backings are carded in thin flakes, rolled up likewise and tied. After boiling, they open in the same flakes they were carded into, and are washed out, and laid to whiten in that form. I send
you,

you, however, a sample of the backings of white flax, that was only boiled four hours, and never laid down to whiten. In the course of this short process, you will see that the material of which sacking is made, is considerably mended, though I think it wants another hour's boiling, and that a week's whitening would have taken off that harshness of the flax it still in some degree possesses. It requires being beat, or put into a press, before it is carded on cotton cards, to separate the fibres, which seem to be set at liberty from each other, by a dissolution of some resinous substance in the flax, at the same time that the oil of that plant is converted into a kind of soap. When I mention white flax, I do it in opposition to that, which being steeped in the bags, has the appellation of blay ; this getting a tincture from the heath, has its colour rather fixt than discharged, by being made into cotton. You inquire into the results
of

of my pursuits concerning fixing lasting tinctures on linen. The tedious sickness, and at length death, of a friend, kept my mind for many months this summer, in a situation of languor that is a total enemy to the busy occupations of curiosity, and when I resolved to engage myself therein, to keep off unavailing reflections, I found it too late for many herbs I had set down in a list, and that a plat of weld I had planted the autumn before, had never come up. I then employed myself with the purple fish found on the Newcastle shore. They answered all the smaller experiments mentioned by Reaumur and Templeman, but those Dr. Holland has given, in his translation of Pliny, the naturalist, they in no degree corresponded to; with all the boiling in lead and salt prescribed by him, they only produced a very ill-looking soap. Though there appears no doubt but the purple wilk found here is the buccinum of the ancients, it however

ever appeared to me that it was probable they got their colour from some moss they fed upon. It could not be the archil, which (as I am told) grows much higher on the rocks than where they lie. I therefore employed a person to search about the places in which the wilks or buccina lie, and to get me some of the moss and sea-weeds that grew near them. My small collection is but just arrived, and I have not had time as yet to try whether my conjecture is true or false. To the purple yielded by the archil, I owed my suspicion, that there might be other mosses that would produce stronger and more permanent dyes. I was trying this morning the solution of tin I got from you, and find it as good as the first day. I shall take some of my cotton, finely spun, to Dublin, that it may receive the advantage of being manufactured by a skilful artist in the loom, and I hope soon to send you a sample of it, when properly

perly wove, that may do it credit. Almost all I have had wove here has been of the coarse kind, and that by weavers who never had seen cotton.

I'am, Sir,

With great esteem and regard,

Your faithful humble servant,

E. MOIRA.

Specimens of the flax prepared by Lady Moira, and of various stuffs manufactured from it, are preserved in the Society's Repository.

When I received, Sir, the favour of your last letter, I daily expected returning to these mountains, and from that expectation postponed acknowledging it, thinking that this place would yield me more leisure than my engagements in town then afforded me. Had I foreseen that my

O

stay

stay would have been extended to the time it was, I should not have been guilty of that neglect. Since my arrival here, an opportunity has not occurred for my sending a packet before the present one, and it is now eleven o'clock at night, when I am informed a messenger is to be sent off at five in the morning to Belfast. I have no reason to be vain of the samples I have sent you ; they merely shew, that the material of flax cotton, in able hands, will bear manufacturing, though it is my ill fortune to have it discredited by the artisans who work for me. I had in Dublin, with great difficulty, a gown wove for myself, and three waistcoats ; but had not the person who employed a weaver for me, particularly wished to oblige me, I could not have got it accomplished ; and the getting spun an ounce of this cotton in Dublin, I found impracticable ; the absurd alarm, that it might injure the trade of foreign cotton, had gained ground, and the spinners, for what
reason

reason. I cannot comprehend, declared themselves such bitter enemies to my scheme, that they would not spin for me. Such is my fate, that what between party in the metropolis, and indolence in this place, I am not capable of doing my scheme justice. That it should ever injure the trade of foreign cotton, is impossible ; though long accustomed to behold shoes and stockings looked upon, in this part of the world, by the generality, as quite unnecessary, yet I cannot think but some apparel is requisite ; and as the price of wool is so high, and the poverty of the people so great, I did wish to introduce amongst them that invention, which I saw might be greatly improved, and turn the refuse of flax into comfortable clothing, and by a process so easy, that every industrious wife and children might prepare it ; and those who are supposed to adopt this clothing, are such as would never think of manufacturing foreign cotton for themselves and families.

lies. I send you a sample, Sir, of the backings made into cotton, which you see might be manufactured into no bad clothing, and backings of tow being sold to me, at the dearest time, at one penny per pound, it is rating it high to say, that at two-pence per pound a person might have it ready to spin. All the patterns I send you are of webs now in use, and those I have given away, or that have been worn in my own family, have worn exceeding well; I should except the small pattern of plush, which was only a few quills that were thrown in at the end of a piece of worsted plush, to see what pile it would produce. My gown is wove in imitation of a kind of India muslin, and the thread you will see must have been strong from the breadth, which is full yard and half wide. I must beg your acceptance of a waistcoat, a very poor imitation indeed of Manchester ingenuity, but the finer spun cotton was used in my gown; and as I have already told you, Sir, that I had a
quantity

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quantity of cotton in town, I intend immediately setting to work, but all in coarse and cheap manufactures, such as may benefit and suit the lowest classes of life; the rich meriting as little to be considered in my scheme of manufactures, from that capriciousness that generally attends them, as they are to be the objects of much attention, in any scheme that is to extend its influence to the most numerous part of society.

I am, Sir,

Your much obliged,

And faithful humble servant,

Montalto, Ballynahinch,
July 31, 1775.

E. MOIRA.

Several specimens of the above-mentioned manufactured tow, are reserved in the Society's Repository.

Premiums for Inventions in Mechanicks.

159. TRANSIT INSTRUMENT.

To the person who shall invent and produce to the Society, a cheap and portable Transit Instrument, which may easily be converted into a Zenith Sector capable of being accurately and expeditiously adjusted for the purposes of finding the latitudes and longitudes of places, and superior to any now in use; the gold medal; to be produced on or before the last Tuesday in January, 1784.

160. GUN HARPOON. For every Whale taken by means of the Gun Harpoon; to the person who first strikes such fish therewith; two guineas.

N.B. Proper Certificates of the taking such Whales, in the year 1783, signed by the master, or by the mate, when the claim is made by the master; to be delivered

delivered to the Society on or before the last Tuesday in December, 1783.

161. GUN FOR THROWING HARPOONS. To the person who shall produce to the Society, the best improvement in the construction of a Gun for throwing Harpoons, so as to render it more manageable than those at present in use ; the silver medal, or ten guineas,

To be delivered to the Society on or before the first Tuesday in December, 1783.

162. HARPOON TO BE THROWN BY A GUN. To the person who shall produce to the Society, the best improvement in the construction of a Harpoon to be thrown by a gun ; the Harpoon to be so contrived, that it may strike and hold the fish with more certainty and greater effect than any hitherto made use of ; the silver medal, or ten guineas.

To be delivered to the Society on or before the first Tuesday in December, 1783.

163. MACHINE FOR TRANSPORTING TIMBER. To the person who shall produce to the Society a model of the best, most simple, and cheap Machine or Carriage for transporting Timber, or other heavy materials, on soft or clayey roads, at the least expense; to be sent in on or before the last Tuesday in November, 1783; twenty guineas.

164. IMPROVEMENT OF THE HAND VENTILATOR. To the person who shall produce to the Society, on or before the last Tuesday in February, 1784, a portable Ventilator, to be worked by hand, better adapted and more efficacious for extracting foul air from gaols, prisons, and ships, than any now known or in use; the gold medal.

165. ARCHI-

165. ARCHIMEDEAN OR WATER SCREWS. To the person who shall produce to the Society, the most satisfactory account or proof, either by model or otherwise, of the mean helical angles of Archimedean or Water Screws, which shall raise the greatest quantity of water by a given power, under the respective elevation of 30, 45, and 60 degrees of the whole machine; together with the proportion of the diameter of the shaft, to that of the whole internal diameter of the screw, and what part of the whole diameter of the lower end of the screw should be immersed in the water; the gold medal.

To be produced on or before the third Tuesday in February, 1784.

166. ENGINE FOR WORKING LOOMS. To the person who shall invent and construct an Engine for the purpose of working, at one time, the greatest number of looms, not fewer than three, for weaving silk, woollen, linen,
or

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or cotton goods (equally well, and more expeditiously than by hand, or by any other method now in use) each piece to be not less than half a yard wide; the gold medal, or thirty guineas.

CERTIFICATES of the working such Engine, with samples, not less than one yard long, to be produced on or before the first Tuesday in January, 1784.

167. CRANES FOR WHARFS. To the person who shall invent and produce to the Society, a model of a Crane for Wharfs, on a scale of not less than one inch to a foot, the construction to be such, that the power may be varied in a simple manner, according to the weight to be raised, and by which a greater weight shall be lifted by a given power through a like space, than by any at present in use; the gold medal, or twenty guineas.

To be produced on or before the first Tuesday in February, 1784.

N.B.

N.B. The model should neither be of the walking wheel, nor capstan kind.

168. CARRIAGE TO CONVEY ENGINES FOR EXTINGUISHING FIRES. To the person who shall invent and produce to the Society a Machine or Carriage for conveying Engines for extinguishing Fires with greater ease and safety than any now in use, and from which they may be delivered in the most perfect state for working; the gold medal.

To be produced on or before the last Tuesday in January, 1784.

A Bounty

A Bounty of Twenty Guineas was given to Mr. Spalding, of Edinburgh, for his improvement on the Diving Bell, 1776.

A relation of some attempts made with the Diving Bell, constructed on a small scale, but on the same principles with that of Doctor Halley, during part of the summer and autumn of 1775, with the proposed improvements.

I beg leave to be indulged in giving a short account of the reasons that first induced me to engage singly in this expensive and hazardous enterprise.

Having a large concern in the cargo of the Peggy, Thomas Boswell, Master, from London for Leith, with a very full and valuable loading; this vessel, with two large ships belonging to Newcastle and Shields, were, in a severe storm, wrecked on the Scares, or Fern Islands, in the night of the 3d, or morning of the 4th of December, 1774, where all the crew and passengers perished; the light goods thrown

on shore from Sunderland Point, to Holy Island, gave the first intelligence of our loss.

At several meetings of the traders, I was unanimously requested to take the management of this business, and collect what could be recovered of the cargo and vessel. This, to the utmost of my power, at that severe season of the year, I performed, but never found any part of my own property.

On this occasion the utility of Doctor Halley's Diving Bell occurred to me in the strongest manner, particularly as I thought I had discovered the place where it might reasonably be presumed the bottom of our vessel lay, depressed in the water by the heavy goods usually stowed in the lower tiers.

At my return to Edinburgh, I consulted every author I could find, on the subject of diving, and the Diving Bell, and in June last made repeated trials in the roads of Leith, in various depths of five,
six,

six, and eight fathoms water, making several alterations which experience suggested. My apparatus being in tolerable order, I sailed for Dunbar, thirty miles distant, in an open long boat, sloop-rigged, about six or eight tons burthen, where, by a mistaken account, I was informed the bottom of the Fox ship of war lay ; but on my arrival, the oldest seaman in the place could give me no intelligence, as that vessel perished in the night, with all on board, somewhere in Dunbar Bay, and by storms, in so long a period as thirty years, was thought to be sanded up. In order to gratify the curiosity of some friends there, I however determined to go down, where it might be thought probable her bottom lay ; but in seven and eight fathoms water, found nothing but a fine hard sandy bottom ; from whence I am led to conjecture, that the proprietors of the valuable effects, which were on board that vessel, might find their account in sweeping for her. Now I was informed that a vessel, which was thrown by accident

dent in the river Tay, near Dundee, with a large quantity of iron, lay within two fathoms of the surface at low water; I determined to make trial there, and accordingly sailed across the Firth to that place, about fifteen leagues distant from Dunbar, having prevailed on my brother, and brother-in-law, to accompany me in all these expeditions, with two seamen, which were my whole crew.

At Dundee Mr. Knight and Mr. Leighton, the masters of two vessels, with a few seamen as assistants, sailed out to the place on which it was conjectured, by the landmarks, this wreck lay; but at the same time they informed me, that the great quantities of ice in the winter of 1773 had either sunk, or entirely destroyed, the remains of this vessel; concerning which I was soon satisfied: for, notwithstanding the rapidity of the tides, I went down three different times, changing the ground at each going down. I fell in with a stump of the wreck, now sunk five fathoms deep

deep at low water, to a level with the soft bed of the river, which is composed of a light sand intermixed with shells.

By the muddiness of the river there is a darkness at only two fathoms from the surface, that cannot be described; from the smallness of the machine, which contained only forty-eight English gallons, it was impossible to make this attempt with a candle burning in it, which would consume the air too quickly for any man to be able to work, and at the same time pay attention to receiving the necessary supplies of air, that important support of life. Two days after, we sailed for Leith, where we happily arrived at four o'clock next morning. The trials I had hitherto made, were only preparatory to my views at the Scars, hoping that the experience I had acquired, would enable me to surmount the dangerous difficulty of the unequal rocky bottom I had to contend with there; but in the preceding trials and different alterations of the machinery, so much time
had

had been lost, that I could not sail for Bambrough before the first of September, the weather then being stormy, it was three days before I arrived there in my small open boat, yet, though so near the equinox, I was in hopes I should still have a few days of calm weather; but after many unsuccessful attempts, could make no trial until the end of September.

This tedious and vexatious interval was greatly softened by the kindness and hospitality of the Rev. Doctor Sharp, Archdeacon of Northumberland, his lady and family, at Bambrough Castle, whose friendly concern I will always remember with the sincerest gratitude.

Having at last some favourable weather, I sailed to the Scares, with my brother and three sailors I had brought with me from Leith, also two pilots from Bambrough and Warren.

By the calmness of the weather, it was four in the afternoon, about high water, before I could go down, at a small di-

P

stance

tance from the place where I judged the wreck to lie: the depth was about ten fathoms. I happily alighted on a flat part of the rock, within a small space of a dreadful chasm, and had just gone two steps with my machine, when the terror of the two pilots was so great, that in spite of my brother they brought me up very precipitately, before I had in any degree examined around me; on coming into the boat, they remonstrated on the danger of the machine being overturned either on the wreck or the rocks, and also on the impossibility of raising any of the weighty goods with so small a purchase, in an open boat; where at this season no large vessel would venture to lie, as the nights were now so long, and only two passages for a small vessel to run through, in case of a gale of easterly or southerly wind: one of the passages extremely narrow, and both of them dangerous. As the tide now ran in the face of the rock we lay at, the pilots would not consent to lie at anchor any longer; lest,

lest, wind and tide being both contrary, they should not be able to conduct us safely through the islands before it was dark.

I was obliged to comply, very unwillingly, with their intreaties; though part of their assertions came too truly to pass, for in sailing home we cleared the rocks and islands with difficulty, but not before eleven o'clock at night, and even then with hard labour.

Convinced from this, that with an open boat nothing could be accomplished to purpose, and, except in June and July, no man would risk himself with me in a sloop, to continue a few days and nights at anchor there; I was obliged to abandon this ultimate aim of all my attempts: yet though my boat was too small to raise any great weight, I determined to take a view of the guns of a Dutch ship of war, lost in the year 1704; and as they lay two or three miles nearer the land, I could execute this design with less difficulty, espe-

cially as the weather continued still favourable. Having procured all intelligence possible, we went to the place, and being joined by Mr. Blacket, tacksman of the islands, his son and several other brave fellows, my two pilots, though still with me, having no stomach for the service, I went down four different times, but could find no marks of any wreck, notwithstanding my walking about in five and six fathoms water, as far as it was thought safe to allow rope to the bell; continuing generally twenty minutes or more, each time, at the bottom. On this occasion I was obliged to carry a cutting hook and knife, to clear away the sea weeds, which at this place are very thick and strong; without this method I could not move about. At the fifth going down, each trial being in a different place, I was agreeably surprised to find a large grove of tall weeds, all of them from six to eight feet high, with large tufted tops, mostly growing in regular ranges, as far

as far as the eye could reach ; a variety of small lobsters, and other shell-fish swimming about in the intervals.

On a survey of the ground, I found myself on the extremity of the place where the long-looked-for cannon lay, and one very large picce was nearly covered with round stones, thrown upon it by storms from the south-east ; by the appearance and sound, I judged it to be iron ; but, to form a more certain idea, I tried to pull up a strong weed, expecting some part of the rust, if iron would adhere to the fibres of the root ; but my strength was now exhausted almost to faintness, by such violent exertions in moving about during a space of near three hours, yet still I determined, if possible, to have this weed ; I twisted the bushy top round one of the hooks at the mouth of the bell, on which part of the weight for sinking the machine hung, then, giving the signal, brought the weed along with me. To one side of the root

was fastened a piece of rock, about seven pounds weight ; in the middle of a piece of decayed oak, very black, on the other side a black substance, which on a few hours exposure to the air, changed into a dull reddish colour, resembling crocus martis.

Pressing business requiring me at home the Monday following, I set sail for Leith ; our compass being attracted by the great quantity of iron work in my boat, we were, during the night, in the greatest danger, being twice entangled amongst the rocks, and very much chilled with the cold for want of proper cover ; but escaping these dangers, we safely next morning arrived at Leith.

The proposed alterations in constructing a Diving Bell to hold two persons, which can be managed by a sloop of one hundred tons, or a little under that burthen.

To

To have the machine on the common circular plan, able to contain two hundred gallons English, or a little more, with proper pullies within, by which the weights, which bring it to the full sinking degree, can be lowered down to the bottom; on pulling the rope fixed to this weight, the person or persons in the bell can lower the machine to the bottom, or raise themselves with the bell, so as to take in air from the barrels, as often as necessary; by the same method they may bring the bell to the surface, and the balancing weight can be taken in afterwards. The great and obvious importance of this alteration is, that the bell, as constructed formerly, could never be lowered safely with a man, on any wreck or rocky bottom; but, on the contrary, with the utmost hazard (till the ground was known) of being overturned; by the present amendment no danger can attend it: seamen, nay, even the most timid landmen will, by this means, be soon brought to

use, with boldness, an invention, which may be attended with great advantage to themselves and country.

This machine also, in many places, can be used in the coldest weather, as the men in the bell have no occasion to be above knee-deep in water, for which high-topped water-tight boots, will be a sufficient defence, and a thick flannel dress is preferable to every other.

Edinburgh,
15th Feb. 1776.

CHARLES SPALDING.

TO SAMUEL MORE, Esq.

SIR,

I am favoured with your letter, requiring a drawing of the improvements proposed on the Diving Bell, and my opinion how far the bell can be moved from the line of direction in which it goes down.

In

In answer to the first, I have enclosed a drawing of the bell, to convey an idea of the principles of this improvement.

A bell of the size intended will require from sixteen to twenty hundred weight to sink it; let one hundred of this weight be taken off, and near one foot of the upper part of the bell will float above water: if this hundred weight is again added, the bell sinks with rapidity; nor is its descent affected by any current which does not exceed three knots an hour. I have gone down several times in a current of five knots, and felt very little deviation from the direct line.

The improvement consists in a balancing weight of two and a half, or three hundred weight, suspended from a hook fixed to the top of the inside of the bell; this weight is raised or lowered by means of two double blocks, as in the figure, and determines the rising or sinking of the bell.

I beg

I beg to be understood as describing a bell wherein are two persons, whose weight constitutes a part of that required for sinking the machine, and who are provided with an adequate counterpoise to the want of their weight, when standing on the ground at the bottom,

As to the other inquiry, "How far the bell can be moved from the direction in which it sinks." This greatly depends on the nature of the bottom, the current, and depth of water; on a firm sand, they may in ten fathoms water go from six to eight yards in a minute, and proportionably quicker in a lesser depth, a full charge of air being taken in at bottom, previous to their moving.

In deep muddy clay, or soft sandy ground, their progress must be assisted by the motion of the balancing weight within; by a proper management of this weight, above one-fourth of the diameter at the mouth of the bell, can be gained

gained in a progressive motion, four times in a minute; and on an unequal rocky bottom, nearly the same, making allowance for the difficulty of ascent and descent over the rocks.

When at a distance horizontally from the vessel from which the machine is let down, the motion of the bell must be followed by the long-boat, with small air-barrels and signal-lines; this may be done in easy weather, to the distance of three hundred yards, or more, according to the ground and current, and the return of the bell to the vessel may be assisted by the long-boat, with a gentle motion.

I am, with the greatest respect,

SIR,

Your most obedient humble servant,

Edinburgh,
12th April, 1776.

CHARLES SPALDING.

EXPLA-

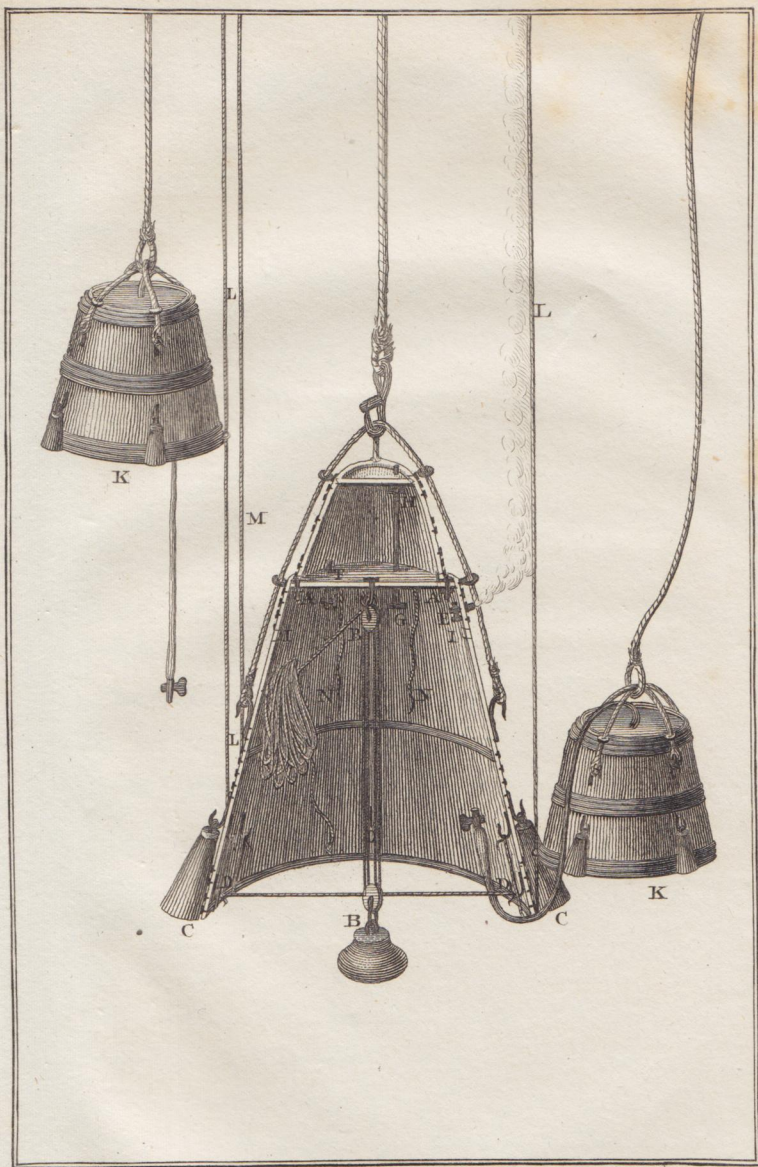
EXPLANATION of the PLATE

*Of the Diving Bell, as improved by Mr.
Charles Spalding.*

CAAC. The body of the bell, to be made of Pipe Staves, five feet long; diameter at bottom five feet; diameter at top two and a half feet.

AHA. The regulator or cap joined to the bell, by the screws AA. so that an aperture is left between the top of the bell and the bottom of the cap, all round, except where these screws join them; this contains about twenty-five wine gallons, and can be taken off from the bell occasionally.

B. The balance weight with its pulleys and rope. The weight is first let down to the bottom of the sea, and by the action of the diver at the pulley rope, though he does not raise the weight, the bell descends;



SECTION
of M. Spalding's improved Diving Bell.

scends ; the bell being loaded with weights C. in such a manner that the relative gravity of the whole machine may be nearly equal to the specific gravity of the sustaining fluid.

D. Hooks to which cross ropes are fastened; for the operator to rest upon; seats round the bell being not only inconvenient, but even dangerous.

E. The common air-cock for passing the phlogisticated air from the bell, immediately into the external water.

F. Another air-cock for filling the regulator with air from the bell, and consequently expelling the water through the before-mentioned aperture, between the cap and the bell.

G. A handle within the bell to open an air-cock H. at the top of the cap for discharging the air, whose place is immediately supplied by the water rushing in through

through the aperture between the cap and the bell, to restore the equilibrium.

I. Small windows.

K. Air-vessels; these vessels being open below, are loaded with weights similar to the bell, so that they descend through the water by their own gravity; in the top of each a leathern pipe is inserted, with a cock on the other end. These pipes communicate the air from the vessels to the bell. They contain about forty wine gallons each, and are directed down to the bell by L, two lines joining to the bell, and the ship above.

M. The signal line.

N. Ropes-ends, to be caught hold of in case of accidents.

Thirty

Fig. I.

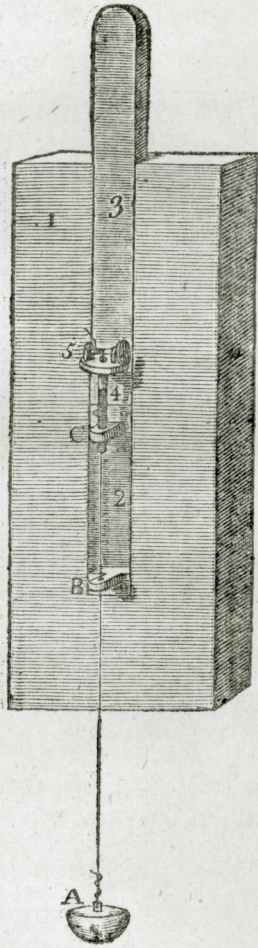


Fig. II.

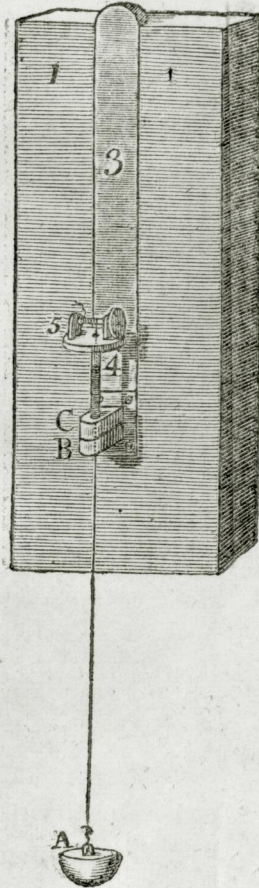


Fig. III.

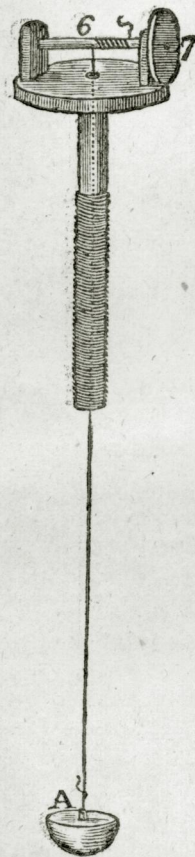


Fig. I. & II.

A.

B.

C.

Now

Then

Fig. I

E X P L A N A T I O N.

- Fig. I. & II. {
1. A strong Board, fixed to a Wall, or Post.
 2. A Groove cut perpendicularly in that Board.
 3. A sliding Slip of Board, moving up or down, in the Groove.
 4. A fine Screw perforated; through which the Horse-hair Rod of the Pendulum passes, and is fastened at its Top to a Roller (described in Fig III.); which Screw serves to lengthen or shorten it in the most minute Degree, as explained in § 7.
 5. A Roller, explained in Fig. III.

A. The Bob of the Pendulum.

B. A Poppet of Brass, called a Cock, fixed to the strong Board, and projecting forward, with a small Hole in it, capable of letting a Horse-hair pass through it. The Plane of this projecting Part is parallel to the Horizon.

C. A similar Poppet, or Cock, fixed in the sliding Slip with a like Projection, and perforated by a Female Screw, in which the Screw No. 4, works; and so ordered, that when the Slider is pushed down, the two Cocks, and also the two Holes (being exactly opposite to each other) may be in close Contact, and perfect Coincidence, without any vacant Space between them, as in Fig. II.

Now in Fig. II. let $AB = x$ = the unknown Length of a Pendulum, which makes 21 Vibrations in 24 Seconds of true Time. And let $BC = d$ = the Distance between the two Cocks, which in Fig. II. is equal to nothing; but in Fig. I. is equal to the Difference in the Lengths of the longer and shorter Pendulum.

Then in Fig. I. let the Slider be lifted up till AB be shortened, and the Vibrations be thereby accelerated, so as to swing true seconds. Let the length of the Pendulum be still unknown, but being compared with the first AB , which made 21 Vibrations in the same Space of Time that the latter made 24, the Difference in their Lengths will appear between the two Cocks B , and C , and this shorter Pendulum must be called $AB - BC$, $= x - d$.

Fig. III. 6. A Roller fixed to a circular Brass Plate, soldered to the Top of the perforated Screw, No. 4, to which Roller the End of the Horse-hair is fastened, and rolled up, or let out, as the Case may require, in order to adjust the longest Length of the Pendulum.

7. A Rub Wheel, to prevent the Roller from slipping, by rubbing against the Brass Plate.

Thirty Guineas, Part of the Premium offered for the Discovery of an Universal Standard of Weights or Measures, were voted to Mr. Thomas Hatton, who sent in a Treatise, together with an Apparatus, under the Title of an Attempt to find, by Approximation, the Universal Standard required. 1779.

SUPPOSING a person in a future time, or in a place when and where no exemplar of any measure may be had.

§ I. He directs the first approach to be made by a detached pendulum coarsely found, by tying together horse-hairs (or other such flexible material) equal in length to five spans (that are made between the thumb and the fourth finger of a middle-sized man), which will give a length to make a pendulum, with a stone of the size and shape of a hen's egg; then let him rectify this pendulum, by lengthening or shortening, till it may make sixty vibrations

tions in the same time that an assistant counts seventy-two pulsations at the wrist of an ordinary-sized man in health : when the length of the pendulum is adjusted to this measure of time, it will be sufficiently accurate as a first apparatus, in order to proceed to the next approximation ;

§ II. Which is by an apparatus consisting of two parts ; the first and principal of which ; is the aforesaid pendulum suspended from a brass or metal poppet, called a cock, contrived to slide up and down in a groove made in a strong solid board (fixed against a wall or post), and the flexible rod of the same pendulum passing through a hole in another poppet or cock fixed in the solid board, perpendicularly under, and parallel to the sliding cock.

The other part of this apparatus, is a movement of the simplest kind, in form of a dial, sufficient to keep the pendulum in vibration, and to keep a register of its time if required.

EXPLA-

§ III. The particular use of the first part, in which the horse-hair, or flexible rod of the pendulum is fixed in the upper or sliding cock, and passes through the small hole in the under or fixed cock (a hole just equal to the diameter of the horse-hair), is to shew, demonstratively, by the distance between the two cocks, the difference of length between any two pendulums, the numbers of whose vibrations are different within the same given time ; as, if one length makes only twenty-one vibrations, in the same space of time that the other swings twenty-four seconds of true time ; which difference this candidate supposes will always appear, by the distance between the two cocks, to be invariably the same in the same latitude, without making any inquiry into the real length of the pendulum in either case, or concerning the centres of oscillation, or the point of suspension from whence the movement begins ; which last, however, must always be, in, or near, the bottom

Q

of

of the lower cock. It is not necessary here to describe the time-piece which this candidate has joined to this apparatus, though of a particular construction, as its chief use is only to count the number of vibrations made in any given time.

§ IV. But, supposing a minute, or other certain portion of true time, cannot be had by machines in use, at all times and in all places ; he proposes to divide the time of one apparent revolution of any fixed star into twenty-one parts, by 75,600 vibrations of his pendulum ; and again, by raising the sliding cock so as to shorten the pendulum, to divide the same space of time into twenty-four parts or hours, by 86,400 vibrations ; and supposing that the difference between the two lengths of his pendulum in these two operations, in latitude 51 degrees 32 minutes, will appear by the distance or space between his two cocks, to be always the same, he calls this distance or space a standard foot for latitude

tude 51 degrees 32 minutes; and asserts that this standard foot, so obtained, is exactly the British foot now in use.

§ V. Here the candidate says, he might rest the solution of the problem, if it be admitted that all nations in futurity may apply to, or have intercourse with, the residents of latitude 51 degrees 32 minutes ;---but if not, he has considered the variation in the lengths of pendulums, vibrating equal times in different latitudes from the equator to the pole, arising in consequence of the spheroidal figure of the earth, according to our present philosophy; and by an Algebraic theorem, with the calculations deduced from it, has shewn that the greatest variation, in his standard foot, taken at the equator, and in latitude 51 degrees 32 minutes, would be little more than the 20th part of a standard inch, independent of the correction which he proposes in the following section.

§ VI. He says he has found that in two pendulums, one whereof swings true seconds, if the difference of their oscillations does not exceed twentyseconds in the space of twenty-four hours, the differences of their lengths will be equal all the world over.

FOR EXAMPLE.

If a pendulum of 39 $\frac{1}{16}$ standard inches be increased in its length by 1-60th part of an inch, its time will be varied by losing twentyseconds of time in twenty-four hours.

§ VII. And he has shewn how to find these small differences, by adapting screws to pendulums, and by making their several velocities (that is, their spiral threads) so that one turn of them shall vary the time only 20, 10, or 5 seconds respectively; the velocities of which screws he finds to be at the rate of 60, 120, or 240 spiral threads in a standard inch.

FOR

FOR EXAMPLE,

Suppose a measure by a straight stick, or by a rod of metal, be taken from between the two cocks of the instrument, as the length of the difference between two pendulums, one of which vibrated seconds of a day of 24 hours, or 86,400 seconds, and the other of a day of 21 nominal hours, or 75,600 seconds; and let this measure be divided into 12 equal parts:---Now to know whether those parts are standard inches of latitude 51 degrees 52 minutes, apply at the upper cock, where the end of the horse-hair pendulum is fixed, a screw, of the length of a 12th part of the aforesaid difference or distance between the two cocks, which screw shall be divided into 60 spiral threads; then adjust the pendulum to swing true seconds, at the rate of 86,400 seconds, in twenty-four hours; and afterwards shorten, or lengthen the pendulum, by one turn of

the screw, or one 60th part of the supposed inch, (for the difference between shortening or lengthening in this infinitely small dimension, is beyond the power of distinction, for the purpose of this experiment). Then he says, if the number of vibrations of this pendulum, in 24 hours, be either faster or slower, (i. e. more or less) than 86,400 seconds, by the exact number of 20 seconds, the said 12th part, or supposed inch of screw applied at the upper cock, is exactly a standard inch, and 12 such inches a standard foot, of the latitude 51 degrees 32 minutes :---But if the difference, by shortening the pendulum by one turn of the screw, should be more than 20 seconds faster, then the screw must be cut coarser, so that the number of threads in the supposed inch, may be made less than 60 ; or if the difference be less than 20 seconds faster, then the screw must be cut finer, so that the number of the threads in the supposed inch, may be more than 60 ;---and whatever number of threads the
said

said inch be divided into, so as, by one turn thereof, to make the exact difference of 20 seconds in the 24 hours, that number of threads must denote so many parts of 60, of the standard inch of latitude 51 degrees 32 minutes : As, if the number of threads be 58, then the 12th part of the difference between these pendulums will be equal to 58 such parts, as that 60 of them will make the standard inch ;---or, if the number of threads should be 62, then 60 of such part will make the standard inch of latitude 51 degrees 52 minutes.

§ VIII. This candidate is more minute in his doctrine of the utility of these screws, in taking accurate measures, than seems necessary for this abstract :---And from the natural affinity between the vibrations of a balance and those of a pendulum, he accompanied his apparatus with a balance beam, the arms of which are shortened or lengthened by screws, in order to illustrate his method of correcting and ascer-

taining the variations of pendulums in different latitudes.

§IX. But he concludes, by saying, that if his approximation proves sufficiently exact for making a standard measure in latitude 51 degrees 32 minutes, then, in order to obviate an objection, which may be made against its universality, namely, that foreign nations may not have intercourse with those of latitude 51 degrees 32 minutes; he adds, that if the modern doctrine of the variation of pendulums in different latitudes be well founded, and that the knowledge of that doctrine may be preserved to future and distant nations, then the standard foot of latitude 51 degrees 32 minutes may be made universal, by adding or subtracting the difference, by variation, between that and any other latitude; i. e. either between latitude 51 degrees 32 minutes, and the equator on one side, or between it and the pole on the other.

And

And that other ingenious persons, in any part of the world, may be informed how to make experiments on the same principle, a more accurate description and printed figures of the principal part of the apparatus are annexed, as presented by the candidate, Mr. Thomas Hatton, Watch-maker and Scale-maker, at No. 5, Prujean-Square, near Ludgate-Hill, London.

A small machine sent by the candidate remains in the Repository of the Society, for the inspection of the ingenious.

Premiums

*Premiums offered for the advantage of the
British Colonies.*

169. NUTMEGS. For the greatest quantity of merchantable nutmegs, not less than five pounds weight, being the growth of his Majesty's dominions in the West Indies, and nearly equal to those imported from the islands of the East Indies; the gold medal, or one hundred pounds.

Satisfactory Certificates from the governor, or lieutenant-governor, or some persons of known credit, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in January, 1784.

170. The same premium is extended one year further.

CERTIFICATES to produced on or before the first Tuesday in January, 1785.

171, 172.

171, 172. BREAD-FRUIT TREE.

To the person or persons, who between the first of June and the fifteenth of August, 1784, shall bring into the port of London the greatest number of plants of one or both species of the Bread-Fruit Tree, in a growing state, not less than three of either species ; the gold medal.

173, 174. The same premiums are extended one year further ; the plants to be brought into the port of London, between the first of June and the fifteenth of August, 1785.

N. B. The plants which obtain the premiums are to be the property of the Society, to be disposed of according to their discretion.

175. The Society being informed that a considerable quantity of oil can be obtained from the Seed of Cotton, and that after the expression of the oil, the remaining cake will afford a strong and hearty food for cattle ; and likewise, that the
apparatus

apparatus for the operation can be applied to the mill for sugar canes, and worked in the rainy season, at a moderate expense ; have resolved, for the foregoing reasons, that the procuring oil from the Seed of Cotton is a proper object of a premium, considered as an encouragement for planters to extend the cultivation of Cotton, an article essentially requisite to increase the manufacture of that commodity in this country.

The Society therefore offer as follows.

OIL FROM COTTON SEED.

To the planter in any of the British islands of the West Indies, who shall express oil from the seed of Cotton, and make from the remaining seed hard and dry cakes, as food for cattle; the gold medal.

CERTIFICATES that not less than one ton of the oil has been expressed, and five hundred weight of the cakes obtained, to be produced to the Society, with two gallons

COLONIES AND TRADE. 253

lons of the oil, and two dozen of the cakes, together with a full account of the process, on or before the last Tuesday in November, 1785.

For the next greatest quantity, not less than half a ton of oil, and two hundred weight of the cakes ; the silver medal.

The

The gold Medal was given to Mr. Andrew Bennet, of Tobago, for the best Specimen of West-India Cotton, and for the following Letter to his Correspondent in London, containing an Account of his Experiments and Observations on several Species of Cotton, together with some Remarks on the Culture, 1778.

Tobago, July 2d, 1777.

Dear Sir,

I now sit down to give you some account of the samples of Cotton I have prepared for you, and of the steps I have taken from first to last, in order to find out and cultivate the best and most profitable sort, that this valuable branch of commerce, so long neglected, might be brought to some tolerable degree of perfection ; but as I am to give you a description of several sorts of Cotton, it may not be amiss to premise, that a few sorts of
Cotton

Cotton are not only distinguishable from all others, but may be ranged into classes. Such are the Silk Cotton, the Vine Cotton, and what I shall call the Broad Lock. The Silk Cotton you must be, in some measure, acquainted with ; there are perhaps twenty different sorts of it, but they are all fine, more or less, and have a long staple : the trees produce a prodigious number of pods, many of which contain four locks ; the pods, the locks, and the seeds, are very small ; some of them have clean seeds, and may be ginned without much difficulty, if done with care ; but most of them have foul mossy seeds, which render them hard to pass through the gin ; much of the moss also rubs off in ginning, and mixes with the cotton. One sort of the Silk Cotton is extremely fine and white, but the seed is entirely surrounded with green moss, for which reason it is impossible to gin it ; but it may be hand-picked with difficulty. I fancy this must be the sort which came originally from Siam.

Siam. I prepared a parcel of the silk, and also a parcel of the kidney, or Brazilian Cotton, for the Society of Arts, two years ago; but on finding afterwards that their premium was confined to North-America, I sold them to Messrs. Franklins, who sent them to Manchester, where they were sold for 2s. per lb. when the market price of common Cotton was 22d. per lb. They could not be afforded, picked so clean, for less than 3s. per lb. on account of the very small quantity which a negro can manage, and the trouble attending it. Not one sort of them is worth cultivating, unless the manufacturer would give forty or fifty per cent. more for it than for common Cotton; yet I fancy that the silk is the St. Domingo Cotton, but am not certain. The Vine Cotton consists of a great variety, perhaps forty or fifty different sorts; but their characteristic is this: the cotton adheres only to the bottom, or round end of the seeds, for which reason it is the easiest of all Cotton to gin; in general the trees
bear

bear a good number of pods, and ratoon well ; the pods are rather small than large. Some sorts of the Vine Cotton are coarse ; most of them rather coarse than fine ; some rather fine than coarse ; and a few of them are really fine ; but the locks of most of them are very apt to fall from the trees soon after the pods open, and some of them when open turn back, and present their inner sides to the sun, and then fall down and mingle with the dirt, whenever they are shook a little by the wind. The Broad Lock consists of a moderate variety, and may be classed with as much propriety as the Silk or Vine Cotton, and for the same reason, having one mark common to the whole species, by which also they are distinguishable from every other sort of Cotton. In general the pods are large, and some very large ; the Cotton is fine, and some of them very fine ; the Cotton adheres to seven-eighths of the surface of the seeds, which renders it proportionably hard to gin. However, the seeds are

R clean

clean or free from moss, except that the points, or small ends of the seeds of some sorts are covered with a little tuft of green or brownish moss, which partly rubs off in ginning. This tuft also prevents the seeds from opening in a kindly manner when put into the ground, and occasions them to rot. The seeds of some other sorts, that are not fine, have also this tuft, and consequently it can be no mark of the fineness of Cotton; yet novices will judge of the goodness of Cotton by this mark, and speak of it as a certain sign with some confidence. The circumstance by which the Broad Lock is distinguished from all others, and which pointed out this name as the most proper, is this: when the pod opens, the locks do not hang down like the locks of other Cotton, but stick to the side of the pod, and spread out broad, and get loose from it gradually as it grows dry; but even then the ends of the locks stick to the bottom of the pod, and the pod will remain open eight or ten days before

before the locks begin to fall. I now proceed to give you what I may call the history of the several sorts of Cotton, or some relation of what I have done, in order to find out the best and most profitable sorts of Cotton, &c. I came to this island in the year 1770; the following year, my land being cleared, I planted some Cotton-seed which was sent down from Barbadoes. In 1772, I examined the Cotton as it opened on the trees, and was surprised to find so great a variety among it, and especially so many bad sorts: I imagined that the person who sent it down must have collected it from all the Cotton estates in that island; and could hardly think otherwise, till I got some seed from Cariaçou, and found nearly as great a variety among that also. It appeared evident to me, though a stranger to the business, that it was capable of great improvement. Being fond of experiments, I began with picking Cotton from a tree which bore large pods; I

planted the seeds, and got a tolerable crop in 1773. The trees being cut down, and the ground cleaned, I had the mortification to find they did not thrive a fifth part as well as the other trees, which were much neglected. Thus, by my first experiment, I lost several hundred pounds of cotton in 1774, when cotton first bore a good price; but I learnt from this, and other circumstances, that some sorts of Cotton did not ratoon or stool so well as others. How astonishing is it, thought I, that the Cotton planters should, even to this day, pay so little attention to their business, and remain so profoundly ignorant of Cotton; that they should cultivate so many bad, indifferent, and unprofitable sorts with the good; that not one man should be found in all our islands, who has taste and curiosity enough to make himself master of the business, and to select the best and most profitable sorts, and reject all the others. Such were my reflections at that time; but perhaps they were

were too severe ; the reasons are now obvious, and the difficulties many more, and much greater than I could then conceive : the loss above-mentioned, however, did not deter me from making the trials. Having gained a little knowledge, I was now determined to exert myself, and endeavour to find out and cultivate the best and most profitable sorts. I was told, however, that the best would not fetch a better price than the common sorts. This was a discouraging circumstance ; but being animated by an ardent wish for the flourishing state of British manufactures, I began, in 1774, with examining almost every Cotton-tree on my land. Not content with this, I collected some seeds from the best I could find from the neighbouring estates. I also bought a small parcel of seed Cotton, and examined almost every lock, the seeds of which I sorted and planted in several places, each sort by itself ; at last I found the part of a lock which had five seeds in it ; these seeds

were very foul and mossy, but the Cotton appeared to be excellent. I planted them near my house, and gave them every advantage they could receive from soil and culture. The trees yielded well in 1775. I found the Cotton hard to gin ; but being urged on by a kind of enthusiasm, to bring this article of commerce to the greatest degree of perfection I possibly could, I was hardy enough to plant seven or eight acres with this bad seed, the trees of which last year yielded but a scanty crop, and a greater proportion of these trees died after they were cut down, than of any other sort in my land (the Brazilian or Kidney Cotton-trees only excepted); on account of the difficulty of ginning it, and the scanty crop, I resolved to plant no more of it; and it also appeared unnecessary, since from the several collections made the two preceding years, I had got other sorts nearly equal in goodness, and much easier to gin ; but this is the sort which I call the Green Moss, of which I send
you

you a sample of 10lb. weight, for the Society of Arts, and also 10lb. weight, or more, of the Kidney, or Brazilian Cotton, in order to gain the gold medal. In 1775, I examined the several select sorts planted the year before, but none pleased me so well as the Green Moss; still aiming at perfection, I searched for all the best sorts I could find, not forgetting to connect the planter's interest with the perfection of the manufacture. In my search from day to day, I found one sort which bore a prodigious large pod, ninety of which, on an average, and eighty of the largest, weigh one pound. This, from its size, and staring and rough appearance, I call the Bull's Head. I was transported with the discovery. You undoubtedly wish for a sample of it. You have it, No. 4. B. H. It is not fine, but perhaps may pass for middling common Cotton. You will let me know what the connoisseurs think of it; it seems too valuable to be rejected, though I doubt if it will be so valuable

on the whole as the Broad Lock. About the same time I found another sort, which bore a large pod, one hundred and ten of which weigh one pound; this is called Guava Cotton, you have a sample of it in No. S. G. C. I have planted the seeds of both sorts twice, and have found the number of pods on a tree to be nearly in proportion to their size: and it remains a doubt with me to this day, whether those sorts which grow in a large pod, or the best of those which grow in a small or middling one, yield the greatest quantity of Cotton on the whole. I have this year picked sixty-six ounces of good, and six or seven of damaged Cotton, from one tree, three years old, that bears but middling pods, not less than one hundred and forty of which are a pound weight: hearing a great deal about the staple of Cotton, and being told that Cotton which had a good staple was better than a finer sort with an inferior one, I resolved to look out for all that had the best staple, as far as I could

could judge of it in the lock, not regarding any other circumstance, except that I would not choose a coarse sort; in this collection, as in every other, I was obliged to examine fifty or one hundred different sorts, before I could find one to please me. However, I collected, from time to time, nineteen different sorts of this kind, the seeds of which I planted in nineteen rows, each sort in a row, but am not altogether pleased with it, as might be expected; some of them are too hard to gin, and some not fine enough. I was not then well acquainted with the Broad Lock, as a distinct class or species; but I now find two of that sort among them, and they are some of the best; you have a sample of it in the bag marked No. 19. C. Number Nineteen is the name of it: my fine Cotton consists of the Green Moss, the Broad Lock, and Number Nineteen. You will naturally observe how much trouble I must have taken from first to last, in collecting all these different sorts, which
can

can only be done in crop time, and particularly how much of it might have been saved, if I had been happy enough to have had with me a perfect master of the business, to guide me in my choice; but this most agreeable amusement was laborious and fatiguing to me, chiefly on account of my constant bad state of health. Still urged on by the same anxiety as before, I laboured hard last year in quest of a more perfect sort than I then possessed. After a great deal of fruitless search, I at last found one sort, which bore a very long pod, the locks very loose, and drew out to an uncommon length, like the Silk Cotton; the tree had but a few pods then remaining on it, but I saved and planted the seeds, and am much pleased with the Cotton; it is not very easy to gin; I called it the Long Pod. Upon the whole, I prefer Nos. 1 and 2, to any others of the fine Cotton. I have this year collected some of the best of those sorts, which are easy to gin; you may expect samples of them

next

next year, but I find that entire perfection in this matter seems to be unattainable ; what further discoveries may do is uncertain. I have hitherto gained some new insight every year, and see clearly that there is a hundred times more to be learned about Cotton, than its planters imagine ; but I fancy I have nearly got to the *ne plus ultra*, and expect nothing more than some little improvements on the discoveries already made ; the samples are marked thus : Kidney or Brazilian, No. 1. Green Moss, No. 2. For the Society of Arts.

I am, dear Sir,

With great esteem,

Your most obedient humble servant,

(Signed) ANDREW BENNET.

To ———, Esq.

London.

GENERAL

GENERAL CONDITIONS.

Notwithstanding the Society reserve to themselves the power of giving, in all cases, such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole, if there be no merit ; yet the Candidates may be assured, the Society will always judge liberally of their several claims.

It is required, that the matters for which premiums are offered, be delivered in without names, or any intimation to whom they belong ; that each particular thing be marked in what manner each claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the claimant's name and address.

No papers shall be opened but such as shall gain premiums, unless where it appears to the Society absolutely necessary
for

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for the determination of the claim: all the rest shall be returned, unopened, with the matters to which they belong, if inquired after by their marks within two years; after which time, if not demanded, they shall be publicly burnt, unopened, at some meeting of the Society.

All models of machines, which obtain premiums or bounties, for the future, shall be the property of the Society.

All the premiums of this Society are designed for that part of Great Britain, called England, the dominion of Wales, and the town of Berwick upon Tweed, unless expressly mentioned to the contrary.

The claims shall be determined as soon as possible after the delivery of the specimens.

No person shall receive any premium, bounty, or encouragement from the Society, for any matter for which he has
obtained,

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obtained, or proposes to obtain, a patent.

A candidate for a premium, or a person applying for a bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such premium or bounty, and be deemed incapable of obtaining any for the future.

The performances which each year obtain premiums or bounties, are to remain with the Society until the end of May, except as mentioned in the conditions annexed to the premiums offered for promoting the Polite Arts.

No member of this Society shall be a candidate for, or intitled to receive any premium, bounty, or reward whatsoever, except the honorary medal of this Society.

Where Certificates are required to be produced in claim of premiums, they should be expressed as nearly as possible in the words of the respective advertisements,
and

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and should not be from the candidate, (solely) but from some other person, or persons, who have a positive knowledge of the facts certified.

Where premiums, or bounties, are obtained, in consequence of specimens produced, the Society mean to retain such part as they may judge necessary, making a reasonable allowance for the same.

No Candidates shall be present at any meetings of the Society or Committees, or admitted to the Society's rooms, after they have delivered in their claims, till such claims are adjudged, unless summoned by the Committee.

By order of the Society,

SAMUEL MORE, Secretary.

N. B. Any information or advice that may forward the designs of this Society
for

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for the publick good, will be received thankfully, and duly considered, if communicated by letter, addressed to the Society, and directed to Mr. MORE, the Secretary, at the Society's office, in the Adelphi Buildings, London.

* * * In case any person should be inclinable to leave a sum of money to this Society by will; the following form is offered for that purpose :

Item, I give and bequeath unto A. B. and C. D. the sum of upon condition, and to the intent, that they, or one of them, do pay the same to the Collector for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce ; which said sum of I will, and desire may be paid out of my personal estate, and applied towards carrying on the laudable designs of the said Society.

Premiums

*Premiums adjudged in consequence of the
Advertisements in 1782.*

Class 138, Honorary Premiums. To the Honourable Miss Catharine Southwell, Spring-Gardens; for a Drawing; the Gold Medal.

Class 139, Honorary Premiums. To the Honourable Miss Caroline Walpole, Spring-Gardens; the Silver Medal.

Class 143, Honorary Drawings. To Miss Emma Jane Greenland, Newman-Street, Oxford-Street; for a Drawing; the Gold Medal.

Class 144, Honorary Drawings. To Miss Smith, Great George-Street, Westminster; for a Drawing; the Silver Medal.

145. Drawings of Landscapes. To Mr. Guy Head, Snowhill, first premium; the greater Silver Pallet.

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147. Histo-

274 PREMIUMS ADJUDGED.

147, Historical Drawings. To Mr. William Artaud, No. 26, Villers-Street, York-Buildings, the greater Silver Pallet.

129, Drawings of Portraits. To Mr. Charles Ralph Hurter, No. 53, Great Marlborough-Street; a Silver Medallion.

N.B. Mr. Stock's premium.

130, Drawings of Outlines. To Mr. Thomas Stewart, Union-Street, New Bond-Street; first premium; the greater Silver Pallet.

131, Drawings of Outlines. To Miss Catharine Charlotte Raper, Chelsea; the lesser Silver Pallet.

139, Drawings of Flowers. To Miss Leonora De Yongh, of Old-Ford; the greater Silver Pallet.

MECHANICKS.

Class 173, One-Wheel Chaise. To Mr. Richard Ford, of Birmingham, for the best Single-Wheel Chaise; the Gold Medal.

Bounties

Bounties and Presents in 1782.

To Mr. Richard Winsor, of Totness Devon, for a method of Preventing Rust in Wheat; the Silver Medal.

To Mr. Thomas Stewart, Union-Street, New Bond-Street; for a Drawing of a Landscape; the lesser Silver Pallet.

To Miss English, of Shooter's Hill, for a Drawing of a Landscape; the Silver Medal.

To Miss Cook, of Everton, near Bawtry, for a Drawing of Conisbro' Castle, Yorkshire; the lesser Silver Pallet, gilt.